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THE GAS JOURNAL

JULY 1, 1931

A Glance at the Contents—

Dr. Carpenter Addresses Co-Partners.

The Annual Co-Partnership Festival of the South Metropolitan Gas Company was held at the Crystal Palace last Saturday, when there was an extensive programme of events. In the evening Dr. Charles Carpenter, the President of the Company, addressed those present. [p. 27.]

Presidential Address of Mr. J. D. Smith.

Published to-day is Mr. J. D. Smith's Presidential Address before the Waverley Association of Gas Managers. He expresses his appreciation of the honour conferred upon him in electing him President upon the seventieth anniversary of the formation of the Waverley Association. [p. 37.]

High-Low Temperature Carbonization.

Mr. Howard T. Wright, who describes recent improvements in the design of plant employed by the Bussey Coal Distillation Company, Ltd., at Glenboig, maintains that there is no real controversy between high and low temperature carbonization. Local conditions alone, he says, can decide which—or a combination of both—should be employed. [p. 32.]

New Gas-Works at Mossley.

The New Gas-Works which have been installed by the Mossley Corporation were formally opened by the Right Hon. the Earl of Derby, K.G., P.C., G.C.B., G.C.V.O., on Monday, June 22. There was a very large attendance of visitors, representing both technical and municipal interests, most of the gas undertakings of Lancashire and Yorkshire being represented by the Chairmen of the respective Committees controlling them and by their Gas Engineers. The cost of the new works is approximately £130,000, and a full description of the plant at the new works is given this week. [p. 28.]

New Gas Showrooms Opened at Hackney.

One of the largest of the Gas Light and Coke Company's District Showrooms, Offices, and Stores were opened in Mare Street, Hackney, on June 24 by the Mayor of the Borough. A large company were entertained at tea in the new building, presided over by the Governor of the Company, Sir David Milne-Watson. The new premises are extensive and complete in every detail, with demonstration room, staff recreation room, offices, and stores, which form the headquarters of some 300 fitters attached to the depôt. [p. 34.]

Hot Water Campaign at Stoke-on-Trent.

In order to popularize gas for water heating the Stoke-on-Trent Gas Department have prepared a scheme of hire purchase at inclusive rates, for a selected number of appliances. Lectures and displays were extensively advertised in the local Press; posters were brought into service; and ten thousand invitation tickets were distributed by the showrooms, meter inspectors, and fitters. Afternoon tea was provided free, and music was also provided. The lectures proved popular, and the immediate business secured was very gratifying. [p. 36.]

Eastbourne Gas Company's Enterprise.

Another step has been reached in the prosperous career of the Eastbourne Gas Company, which is now in its eightieth year, by the opening of extensive new showrooms and offices in the main shopping thoroughfare of the town by the Mayor of Eastbourne, who was supported by Mr. Frank H. Jones, M.Inst.C.E., the Chairman of the Company. The new building consists of five floors, including the basement, which is used for the purpose of store-rooms. On the ground floor are the showrooms and offices; on the first floor are other offices, including the District Manager's; on the second floor, the Board-room and offices, including that of the Secretary; and the third floor includes caretaker's quarters and a staff tea-room. [p. 35.]

TO OUR FRIENDS IN AMERICA

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We are pleased to announce that Mr. Robert O. Luqueer, of New York, has become the United States Agent for our publications. Mr. Luqueer is a member of the well-known American Consulting Engineering firm of Messrs. Forstall, Robison, & Luqueer. His early experience in the gas business was in England, as cadet engineer in the employ of Messrs. Humphreys & Glasgow, of London. Returning to the United States, he continued with the American concern, becoming Secretary upon its incorporation, and later a Director. Altogether he was associated in business for twenty-three years with the late Dr. Alexander C. Humphreys, who was known to many in this country both as a gas engineer and President of Stevens Institute of Technology. Mr. Luqueer served one year as Acting Secretary of the American Gas Institute, and is a member of the American Gas Association and the Society of Gas Lighting of New York, and an associate member of the Illuminating Engineering Society.

Hereafter all new subscriptions in the United States will be taken by the New York Agency, and after December, 1931, our present subscribers in the States, with a few special exceptions, will make their renewals through that Agency, which we believe they will find to be a convenience.

EDITORIAL NOTES

The Waverley Meeting

ON later pages is published the Presidential Address of Mr. J. D. Smith, of Belfast, to the Waverley Association of Gas Managers—the oldest of our gas organizations. It is now seventy-one years since the Association was formed, and it is thirty-eight years since Mr. Smith was appointed Secretary. Since 1893, many changes have taken place in our Industry, and to some of these Mr. Smith refers in his Address. First he speaks of our central organizations—the Institution, the N.G.C., and the B.C.G.A. Each of these organizations, he observes, performs its functions in a manner which leaves little to be desired—so well, in fact, that there is a grave danger of the various units of the Industry becoming too dependent upon the central bodies for ideas and for the general advancement of the Industry. The central organizations "are essential for the correlation of certain of our activities and for the handling of questions which affect the Industry as a whole; but they cannot provide a substitute for the individual effort which has built up the position we now hold, and there is a greater need than ever for the old pioneer spirit which was displayed in such marked degree by our forefathers, if we are to continue to hold our proper place and make progress under the present-day conditions of intensified competition." To our mind, at the present day the "old pioneer spirit" can find its best expression in supporting the central organizations. Greater support would bring about much more rapid advancement of the Gas Industry. This support is of two kinds—informing the central bodies of local difficulties and the results of individual enterprise either in the works or on the district; and putting into practice the recommendations of the central bodies. That this support is not what it could be is obvious; and now and again disheartening instances of false economy arise, when the administrators of undertakings, in their first stroke with the axe of economy, cut off their subscriptions to the central organizations. It is a curious line of thought, and it weakens that united front which is so essential.

Mr. Smith refers to the extraordinary increase in the efficiency of gas manufacture during the past thirty years. On the basis of sales of gas per ton of coal carbonized, he quotes a figure of 65 p.ct. increase in efficiency. Though this basis is not a true index, for it does not take into account the thermal value of the gas and the amount of water gas, either blue or carburetted, made, it does indicate the advances which have been made. The most notable achievement, says Mr. Smith, has been the development of the vertical retort; and, to exemplify his contention that the greatest virtue of the continuous system of carbonization is the exceedingly small ground space required, he mentions what happened at Belfast. In 1911, Glover-West continuous verticals were installed on the site of former horizontal retort benches, and the gas-making capacity of the site was doubled. So rapid, however, has been the improvement in the design of the Glover-West retort since that time that it has enabled Belfast to double the capacity of the carbonizing plant again on the same site. To-day the installation has a gas-making capacity of over 766 c.ft. per sq. ft. of ground area.

Coke Sales

CONCERNING waste-heat recovery, Mr. Smith remarks that, so efficient are some of the modern plants, practically as much steam is raised for every pound of fuel consumed in the producers as if that fuel had been consumed under the ordinary boiler; and his comments on the back-pressure principle of applying steam are most interesting. These and other developments demand a degree of engineering ability in the operators of plant which used to be unusual in the ranks of gas engineers.

On the question of sulphate of ammonia, it is obvious enough that, with present conditions of manufacture, an optimistic outlook is unwarranted. In the words of Mr. Smith, "we await the advent of some inventive genius to show us some other way of combining our ammonia with the sulphur we produce ourselves, without the intervention of the acid manufacturer." Perhaps we shall not have to wait long before some solution to this problem is offered. Though the demand for tar is increasing, it is to coke that we must turn in our efforts to reduce the price of gas; and in this regard the observations of Mr. Smith ought to be considered carefully. The outlet for coke is practically a local one, and success depends upon individual effort. Attention should be devoted to instruction of the consumer in the use of coke; and the coke supplied should be a satisfactory product. This, of course, is an old story; but the fact remains that to-day great discredit is brought upon the coke market and the Gas Industry by the supply of coke which contains a large quantity of ash and which is either wet or dusty. Wet coke is not a pleasant fuel for the domestic open fire-grate; it is certainly an extremely expensive one. If a consumer is introduced to wet coke, his introduction is quite rightly also his farewell to gas-works coke for this purpose. As to dust, this is a source of righteous complaint. "Water spraying and quenching," remarks Mr. Smith, "merely have the effect of causing the dust to lie on the pieces of coke as they leave the hoppers, only to be liberated when the bags are emptied in the purchaser's cellar, or at a later stage when the water has evaporated. The only safe cure for this objectionable feature is to remove the dust before the coke is placed on the vehicles for delivery; and here again vertical coke, being in a dry state during the screening process, has the advantage." Mr. Smith puts forward the suggestion that some of our research workers might devote time to the perfection of a coke-fired kitchener.

Finally, we would call attention to Mr. Smith's remarks on street lighting in Belfast. In spite of active competition, the Belfast Gas Department have been able to retain practically the whole of the street lighting in their own hands. There are fewer than forty electric lamps out of a total of approximately 13,000. The replacement of pillar lamps by modern lamps of the suspension type has had excellent results. "The public," says Mr. Smith, "is quick to appreciate our efforts in this direction, and the improvement has been a source of frequent comment of highly favourable nature in the local Press; and these comments have not stopped at lighting alone, but have on occasion led to other eulogies upon the service in general which the Department is giving to its consumers." There is, of course, a moral in this.

Coal Tar Oil as a Motor Fuel

FOLLOWING his Presidential Address, Mr. Smith gave an account of the success which has attended experiments by the Belfast Gas Department regarding the production of coal tar oil suitable for use as a motor fuel—a matter which was mentioned in the "JOURNAL" last week. At the present time, coal tar oil, sold in the ordinary way, is fetching only a penny a gallon—which is almost tantamount to giving it away. The Chemical Works at Belfast therefore decided to wash the light creosote oil with caustic soda, and add 10 p.ct. of solvent naphtha. A quantity of 15 p.ct. of tar acids is left in the oil, and the closed flash-point is 128° Fahr. Preliminary trials undertaken by the Belfast Omnibus Company, Ltd., showed the desirability of employing a special type of carburettor, and of preheating the mixture after it leaves the carburettor. A separate tank is used to contain the oil.

Starting-up of the engine is effected in the normal way by petrol; and then the petrol is turned off and the oil

turned on. Extensive trials have proved that the oil is eminently satisfactory for motor traction work; and it is anticipated that shortly the whole fleet of the Belfast Omnibus Company will employ this fuel. On one run, the mileage obtained with coal tar oil was 12 M.P.G., compared with 8 M.P.G. on petrol; moreover, the tar oil eliminates "knocking." And, as Mr. Smith remarked at the meeting of the Waverley Association, if benzole was used for starting-up the engines from cold, the Belfast omnibuses would be running on 100 p.ct. British fuel. Other important advantages of the creosote oil are that, owing to its high flash-point, it is pre-eminently safe to use, and, because of its composition, the exhaust gases are almost free from carbon monoxide. Actual tests on the exhaust gases of two 'buses, one running on petrol and the other on the washed tar oil, showed that, whereas the carbon monoxide content with petrol was 4·2 p.ct., with the tar oil it was only 0·3 p.ct. The only expense involved in the conversion of petrol engines for use with tar oil would be the provision of an additional carburettor, a manifold, and a fuel tank; and, said Mr. Smith, should this fuel be adopted generally, then a new market will be opened up for a material the value of which as a fuel has not been realized. Mr. Smith gives the production cost of the creosote-naphtha mixture as 4d. a gallon; and it is significant that several foreign countries have expressed their interest in the new project.

Modern Horizontals

In view of Mr. Smith's assertion that there is every indication that the proportion of gas made in vertical retorts will continue to expand at a rapid rate, it is interesting to turn to our account, published on later pages, of the new gas-works at Mossley, which were inaugurated last week by the Earl of Derby. These works cost £130,000, and the horizontal system was chosen as the carbonizing unit. The Engineer and Manager to the Mossley Gas Department, Mr. W. Bennett, explains that, before a decision was reached, all types of carbonizing systems, both at home and abroad, were inspected.

The site at Mossley is an open one, and is in close proximity to the Lancashire and Yorkshire coalfields, which enables the purchase of low-priced clean slack coals delivered at the works. Hence the first tendency was to favour horizontals. Also, Mr. Bennett believes that the future of the Gas Industry lies as much in supplying a clean free-burning solid smokeless fuel as in supplying gaseous energy, and that such a fuel, suitable for domestic grates, can be made at high temperatures provided blending is practised. Ten years' experience in carbonizing various blends convinced him of the great advantages of blending with static charges; and in the design of the new works it was decided to elaborate the blending process. "Our experience of continuous vertical retort carbonization," he says, "did not inspire us with confidence in regard to the economical carbonization of cheap clean slack coals by this system, nor did it lead us to believe that a dynamic charge was so good as a static charge for the knitting together of cokes from blends. . . . Blending of coals in this system is more likely to be adopted for giving ease in working rather than obtaining the most economic all-round results. We were favourably impressed with the intermittent vertical retort system with the advantage it gave for the production of water gas by steaming the charges, and its retention of the advantages of static carbonization. It had, however, disadvantages in its method of charging, causing large volumes of dust and smoke on the top stage and having to deal with large charges of hot coke in bulk at the discharge end."

As the capital costs for horizontals, continuous verticals, and intermittent verticals were about the same, and labour charges with horizontals were as low as with the other two systems, the choice fell upon a modern horizontal unit possessing some unusual features. A Drakes setting was erected, the retorts—the capacity of which is believed to be the largest in the world—being 24 ft. 6 in. long and 24 in. by 18 in. in cross-section; and Mr. Bennett states that his observations on the working of these retorts confirms his view that much longer retorts than these can be installed with satisfaction. Congdon standpipes are fitted, but a departure is made from the common Congdon practice. The gas is caused to cling to the periphery of the pipe in the scrubbing portion, and the liquor also runs down the periphery of the pipe. The gas, on entering and leaving the scrubbing section, deflects the periphery of an umbrella of liquor against the circumference of the pipe. These umbrella sprays are the invention of Mr. Bennett, who explains that, with liquor at 55° Fahr. entering the pipes, all the tar in the gas is brought down in the retort house, the temperature of the gas in the foul main being reduced to 80° Fahr. Another unusual feature of the new works is the coke handling plant, which, modified by Mr. Bennett, is based on the Le Fleuve system which he saw in operation at the Rouen Gas-Works. We feel sure that the account of the Mossley Works which we publish to-day will prove of value to our readers, and that the working results of the plant will be awaited with much interest.

A Notable Achievement

Our Industry has for long been exceedingly well served by the manufacturers of plant and the makers of appliances; not a little of the remarkable development of gas sales during the period since the war is directly traceable to the far-sighted policy and painstaking, accurate research of the manufacturers. And no one will disagree that a noteworthy example of this service is to be found in the work of Messrs. Radiation Ltd., whose efforts to offer the Gas Industry reliable and attractive apparatus of all kinds for cooking, heating, and water heating are all the more effective because they are continuous. Radiation has built up its reputation first by ensuring that no new appliance shall be placed on the market before it has emerged successfully from stringent tests and is capable of satisfying all the requirements of the Industry and the demands of its consumers; and, secondly, by exercising imagination.

Research and imagination had one culmination, eight years ago, in one of the widest known gas cookers on the market to-day—the "New World." Since its birth this cooker has been developed in various directions—the "New World" gas range is an example—though the fundamental principle underlying its operation remains the same. As an achievement of 1931, Radiation has produced a further development of this cooker, which is to be marketed under the designation "Era" "New World," and which will enable gas undertakings to afford their customers—whatever their station in life—a wider choice of good-looking apparatus. This new cooker, which is decidedly attractive in appearance, is within the reach of all, and provision is made for the "Regulo" automatic oven-heat control. Its design, with the height of the stand, is sure to appeal to the modern housewife, who regards her utility appliances as pieces of furniture; and the hotplate is of ample dimensions and capable of full service. But the chief feature of this new cooker is the design of the oven, which, though compact, has an astonishing capacity and is easily capable of cooking simultaneously a complete dinner for six people. This capacity is the result of careful selection of the essential dimensions. We feel sure that this latest enterprise of Radiation Ltd. will meet with a warm welcome at the hands of both the Gas Industry and the public.

Railway Activity

That a great deal of attention has ben paid during the last three years to the development and acceleration of freight trains during the night time, when passenger traffic makes the least demand upon the Railway Companies, is illustrated in "The Times" Trade and Engineering Supplement by some striking examples. By speeding-up and improved connections later times of departure and earlier times of arrival have been made possible, and in one case at least a new train has enabled delivery to be effected at some places a day earlier than

was formerly the case. The value of these progressive steps is likely to make itself more felt when general trading conditions improve. Then every move towards increased efficiency will count in the struggle for the world's markets, and the country's industries will benefit by the better facilities which the Railway Companies are now offering, and by any others which they may be able to devise.

The need for the Gas Industry to prepare itself during quiet times for the better days that must lie ahead has on many occasions been emphasized in these columns, and the "JOURNAL" has provided much evidence of activity in various directions. Gas can render invaluable services to industry, and it must be prepared to do so to its utmost ability. The same thing applies to the Railway Companies. Industry depends upon them to an enormous extent, as they depend upon industry. Both in regard to gas and transport, industry needs—and will need even more in the days to come—the highest possible efficiency in service, which must be combined with the lowest economic price. Now gas is to have its grid, as the railways have their grid, and its development under the care of the enterprising Gas Company to whom it has been entrusted will be watched with hopeful eagerness. The Gas Industry has done well in the past, and has deserved more recognition of its efforts than it has received from those in authority; we look to it, under the organization and leadership at its command, to accomplish even greater things in the future.

As for the Railway Companies, their financial troubles are, of course, notorious. Shareholders have seen their investments diminish in value to an alarming extent, and naturally they have been wondering what can be done to improve matters. It is our own belief that in increasing the efficiency of their service the Railway Companies are taking the very best course that is open to them; if that will not bring them prosperity, and put them in the way of re-furnishing their depleted coffers, what will? Electrification, at the cost suggested, would not be likely to help them, even if it did furnish a useful load to the third grid—the electricity grid; while as to the other alternative, that of increased charges, the less said about it the better. This is evidently the view of the Railway Companies themselves, because, when the Railway Rates Tribunal undertook their 1931 review of charges, the Railway Companies, asked whether they desired to propose any modifications, in view of the fact that in no case had the standard revenue been attained, said, through the Secretary of the Rates and Charges Committee: "After a full consideration of the position, and having regard to the industrial and economic conditions of the country, they are still doubtful whether a general increase of charges at the present time would result in any material improvement in their financial position, while the position of the Companies' revenues is not such as to enable them to propose reductions. The Companies do not, therefore, desire to lay any proposals before the Tribunal for a general modification of charges; but I am instructed to emphasize that this must not be taken to preclude them from bringing forward proposals for increasing charges when in their view circumstances justify such a course."

The final clause would seem ominous, were it not for the qualification "when in their view circumstances justify such a course." Such a time is difficult indeed to visualize now. As a matter of fact, even on the present occasion, with revenue at abnormally low level, traders in the heavy industries (coal, iron, and steel) submitted that a reduction of charges would help both the railways and themselves, as it would contribute to the maintenance and increase of their production and the quantities carried over the railways, and would aid the railways to earn the standard revenue. It is, we feel, in this direction, along with ever-increasing efficiency of service, that the Railway Companies will find salvation.

A German Gas and Electricity Agreement.

It is interesting to learn from Berlin that an agreement has recently been arrived at between the German Union of Gas and Water Engineers and the Union of German Electricity Generating Stations that in future lighting, power, and domestic appliance propaganda work, or at exhibitions, no invidious comparisons shall be made by either side between the two sources of light or power—gas or electricity. The members of the two bodies are being urged to give effect to and honour the agreement in the best interests of both parties.

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

July 3.—MANCHESTER DISTRICT INSTITUTION.—Ordinary General Meeting at Stretford. Inspection will be made of the Stretford Gas-Works.

July 15.—B.C.G.A.—Executive Committee Meeting, 28, Grosvenor Gardens, S.W. 1.

July 17.—B.C.G.A.—Annual Meeting of Chairman and Secretaries of Gas Salesmen's Circles, 28, Grosvenor Gardens, S.W. 1.

Sept. 10.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting in Rothesay.

Sept. 16.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meeting of General Committee at 28, Grosvenor Gardens, S.W. 1.

Sept. 28-30.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at Exeter.

Oct. 9.—NORTH OF ENGLAND ASSOCIATION.

Oct. 27-28.—INSTITUTION OF GAS ENGINEERS.—Autumnal Research Meeting.

PERSONAL

PRESENTATION TO MR. E. J. SUTCLIFFE.

Mr. E. J. SUTCLIFFE, who on June 30 retired from the position of Engineer and General Manager to the Bradford Corporation Gas Department, was on June 26 presented by the Gas Committee with a handsome silver lacquered compote, with a pair of flower vases and fruit dish to match, as a mark of the Committee's appreciation of forty years' loyal and valuable service in the Department. Mr. Sutcliffe has spent practically his entire working life in the Bradford undertaking, and was Deputy Gas Engineer to Mr. Charles Wood for nineteen years before becoming Engineer and Manager in 1927, on Mr. Wood's retirement. In paying tribute to Mr. Sutcliffe's work, the Chairman of the Committee (Alderman George Walker) read a letter from Mr. Charles Wood, who paid similar tribute. Mr. F. J. Cowie (Deputy-Chairman) and other members of the Committee added their appreciation of Mr. Sutcliffe's long service in the Department.

Mr. Sutcliffe is succeeded as Engineer and Manager by Mr. Edward Crowther, Deputy Engineer since 1927, who was appointed four years ago with a view eventually to succeeding Mr. Sutcliffe. Mr. Crowther is a native of Wallasey, and obtained his Master of Engineering Degree by research work at Liverpool University. During the war he served with the technical section of the Royal Engineers. He was formerly with the Aldershot Gas, Water, and District Lighting Company, then with the Wallasey Gas and Water Department (of which his father was a former General Manager), and was Chief Assistant to the Stoke-on-Trent Gas Department when he was appointed Deputy Engineer and Manager at Bradford.

Alderman SIDNEY FLAVEL, of Leamington Spa, Chairman of Sidney Flavel & Co., Ltd., stove and range manufacturers, died on March 16, aged 84, leaving £68,770, with net personalty £66,990.

Mr. SAKURA OKAMOTO, of Tokio, President of the Toho Gas Company, an organization consisting of the amalgamation of a number of important gas undertakings in Japan, with headquarters at Nogaya, has recently shipped to Mr. Walter T. Dunn, M.I.Mech.E., formerly Secretary of the Institution of Gas Engineers, an ornate Japanese granite votive lantern. It has been presented as a souvenir of the sojourn of Mr. Dunn in Japan, during which period he had the opportunity, through Mr. Okamoto, of visiting the chief gas-works of the empire, notably all the stations belonging to the Tokio Gas Company, and those at Kobe and Nogaya.

OBITUARY

The death has taken place of Mr. WILLIAM BLAIR, Assistant Manager at the Haddington Gas-Works. Deceased was a son of Mr. Peter Blair, who has been Manager at the Gas-Works for the past thirty-one years. Mr. W. Blair started his apprenticeship as an engineer in Haddington, and completed it in Edinburgh. He later went to South America, where he gained considerable experience in the managing of modern gas-making plant. After some time in Brazil, he returned to Haddington, and nine years ago was appointed Assistant Gas Manager. It was under the supervision of Mr. Blair that the new gas plant was installed last year. Deceased leaves a widow and two sons, for whom much sympathy is felt.

CORRESPONDENCE

Periodical Re-Verification of Meters by Board of Trade Inspectors

SIR,—I have noted with interest your report of the meeting of the Statutory Meter Inspectors and their renewed advocacy of periodical re-verification of meters. I wonder whether these gentlemen have really considered what such regulations would mean to the Gas Industry, and I should like to ask some important questions. What term of years (or months) would they suggest as the allotted span for a blameless life of a meter, or at what stage in its existence does a meter depart from the path of accuracy outside the limits of the 5 p.ct. toleration? Should it be one, two, five, or ten months, or years? To all who have tried to decide this point, such information would be most useful.

It occurs to me, Sir, that this vital point should be settled before any Government Department attempts to foist upon the gas and meter industries any further restrictions.

The question of the duration of an infallible life is not the only one to be decided upon, for, having fixed that, there arise other considerations, the chief point being the form and conditions under which the test for re-verification should be carried out. Should this take place in the house of the consumer, with the meter *in situ*, or should it be removed, according to the usual gas-works procedure, to a meter testing station probably miles distant? If it is decided that the test is to be carried out *in situ*, then what form of apparatus should be used, for, I take it, nothing short of that already specified in the testing regulations would be adequate—viz., a 20 or 100 light standard wet test meter, and the test to be carried out at standard pressure, temperature, barometric pressure, &c.? It would also naturally follow that the test should be made by a fully certificated Inspector of Meters, with an assistant and also a gas-works fitter and his mate in attendance, to carry out the necessary gasfitting work. This would indeed be a costly business.

If, on the other hand, it is decided to remove the meters from consumers' premises for re-verification, I can foresee all kinds of objections. Those of us who have had experience in dealing with such cases know full well that disconnecting (with the detrimental effect of the atmosphere upon the diaphragms), handling through stores and district, and final transport of the meter to a testing station (which may be miles away) may entirely alter the internal condition of a meter, and the final test would by no means represent the condition of the meter when it was in service.

The cost, too, would be enormous. In the first case, testing *in situ*, probably £1 per meter would be a low estimate; and in the second case 10s. would be a minimum. Added to this would be the cost of stocks of meters, which would mean a considerable increase of dormant capital. And after the expenditure of money, and at great inconvenience to the consumer, if a meter were found to be 2·01 p.ct. fast or 3·01 p.ct. slow (a test result which most likely would not be supported if the meter were tested under ideal conditions), would the meter be condemned and replaced by a new one?

It also seems decidedly unfair that such a restriction and its burden should be imposed upon the Gas Industry, the consumer members of which are already safeguarded better than those in any other of the services. If gas meters are to be made the chief victim of our Standards Department of Inspectors in the name of fairness to consumers, then why not extend that goodwill to electricity and water meters, or any other recorder?

This suggestion of re-verification has a direct bearing upon the credit of the gas and meter industries, and should not be ventilated publicly until my first question can be answered—viz., at what time in the life of a meter should re-verification be necessary? When this question can be answered satisfactorily, the matter might usefully be discussed jointly with the representatives of the Institution of Gas Engineers and the meter industries.

I do not like the suggestion that an instrument which stands alone in industry as the most reliable, automatically acting recorder, is not consistently accurate.

I should not like it to be understood from the foregoing that I am condemning certain forms of *in-situ* testing; on the contrary, I have consistently advocated such as necessary for tracing leakage, or settling disputes. But the suggestion of making a test "compulsory," and "periodical," and "according to standard" bristles with difficulties and anomalous possibilities.

A. T. GILBERT.

Tottenham, N. 17.

Sulphate of Ammonia Manufacture

SIR,—We were very interested to see your Editorial in the "JOURNAL" dated June 24 on the subject of the Alkali Inspector's Report for 1930, and we were also gratified to feel that our own advertising efforts over the last year have been directed in an exactly similar direction to that indicated by this report.

As you know, in the face of great unpopularity regarding sulphate of ammonia plants, we have endeavoured to produce plants using very much less steam than the older ones, and also reducing labour costs to a purely supervisory operation. We feel, however, that a reference might have been made to the cost of sulphuric acid in the

Gas Industry, and a means for overcoming this serious drawback to the manufacture of sulphate of ammonia.

We ourselves have been devoting our attention to obtaining cheap sulphuric acid from sulphur emissions from waste gases from chimneys, and it has been found that there would be sufficient sulphuric acid in England for the whole of England's needs from this source. Further, sulphuric acid can be conveniently manufactured from this source at a very much reduced price, and it would be possible from this source to sell sulphuric acid at about half the price charged at present. But it is also realized that the Gas Industry itself has sufficient sulphuric acid in its spent oxide for its own use; and if some co-operative scheme could be devised whereby sulphuric acid plants were erected for the production of sulphuric acid from spent oxide, and the return of the spent oxide to the source from which it was taken, for further treatment for H_2S, a supply of cheap sulphuric acid would be available to the Gas Industry itself. With sulphuric acid at a reasonable price, and with plant of up-to-date construction such as is emphasized in this report, the Gas Industry should be able to manufacture sulphate of ammonia as cheap as, if not far more cheaply than, from any other source; and, in the words of at least one gas engineer, "if liquor is to be produced in the manufacture of gas, it is better to manufacture the best product from it at the cheapest rate, than to throw it away."

T. O. WILTON,
Joint Managing Director.

The Chemical Engineering and Wilton's Patent Furnace Company, Ltd.,
76, Victoria Street, London, S.W. 1.
June 26, 1931.

ON THE ELECTRICAL SIDE

Bewildering Tariffs.

The desirability of uniform and well-understood bases of charge was referred to by Mr. F. W. Marchant, the Chairman of the London and Home Counties Joint Electricity Authority, when opening new electricity showrooms at Hammersmith. Commenting on the fact that the supply undertakings of electricity in the London and Home Counties area had refused to consider uniform charges for electricity and apparatus, he pointed out that there was need for steps to be taken towards uniformity in the methods and bases of tariffs now charged for electricity supplies, and for the hire of installations and apparatus. In the London and Home Counties electricity district, which came within the jurisdiction of his Authority, he went on to say, there were at the present time 90 electricity supply undertakings, each having its own specially designed form of tariff for various classes of consumers, so that there were in fact hundreds of different tariffs in existence. In this respect the electricity service stood alone among the great public utility services of the day. Water, gas, traffic, and all such services throughout London, and practically throughout London and the Home Counties, were charged to the public on uniform and well-known bases, so that the public knew exactly what they had to pay and what service they got in any part of the district. We agree with Mr. Marchant as to the desirability of uniformity of bases of charge for such commodities as gas and electricity; and simplicity should also be aimed at. It seems that the London and Home Counties Joint Electricity Authority are to discuss the matter with the Minister of Transport and the Electricity Commissioners.

Scarborough by Night.

In the "JOURNAL" dated Aug. 7, 1929, we reproduced a photograph which had been published in "The Times" of the South Bay of Scarborough. The picture was taken about midnight, and it furnished a splendid example of up-to-date gas lighting. In view of the statement we made then, that "all the public lighting in the 'Queen of Watering Places' is by gas," any readers of the "JOURNAL" who may have come across a photograph published by an electrical contemporary a week ago—presumably of the North Bay—must have been somewhat confused. The description beneath this photograph reads: "Electric light effects of Scarborough by night, showing flood-lighting of the Castle on the hill top." What has become of all the gas lighting? If it is in the picture—there are many lights shown on the water-front—we might suggest that our contemporary's description would have been more accurate had the fact been mentioned.

NOTES ON NEW BOOKS

LABORATORY GUIDE TO FUEL ANALYSIS.*

This handy volume presents a description of a number of analytical methods employed in the testing of fuels. It is mainly concerned with solid fuels, though there is a short section devoted to the analysis of tar; and the subject of gas analysis (including determination of calorific value and density) is treated in connection with assay tests applied to ascertain the yields of carbonization products. Other subjects dealt with include sampling, moisture content, ash content, ash composition and fusibility, proximate and ultimate composition, calorific value and the nature and estimation of the sulphur compounds present in the mineral constituents as well as of the organic sulphur. A section is also devoted to methods for studying the degree of coalification of solid fuels.

The author has decided views on the limitations of the methods normally employed in the determination of the moisture content of solid fuels, and advocates his own method which is based on extracting the fuel with alcohol and determining the critical solution temperature of petroleum ether in the mixture of alcohol and water thereby obtained. The author's micro-method for the determination of the softening point of fuel ash is also described—namely, the heating of a small sample of the pulverized ash on the flattened junction of a thermo-couple.

Due recognition is given to the difference between the ascertained ash content of a coal and the actual content of non-combustible matter, and examples are given in which these differences, due to the nature of the non-combustible matter, are sufficiently large to render the calculation of the composition of the coal on an ash-free basis utterly useless.

The usefulness of the book is to a certain extent limited owing to the fact that the treatment is somewhat perfunctory in some of the sections. This will doubtless be rectified in future editions.

* Brennstofftechnisches Praktikum, by M. Dolch. Halle, 1931, Wilhelm Knapp; pp. VIII. + 148. Price RM. 8·80 unbound, RM. 9·80 bound.

CONTINENTAL NOTES

REFRACTORY COATINGS.

L. Litinsky in "Feuerfest," 1931, 7, 65-80 (May), describes the use of protective coatings which are employed to render refractories more immune against the harmful effects of gases, slags, ash, metals, and oxides and to improve their resistance to temperature fluctuations. In such coatings, not only are the composition and refractoriness of the main constituents of great importance, but the nature of the bonding agent is of equal importance. For successful results to be realized, the mixture must be able to develop a surface free from cracks and of low porosity and the thermal expansion must be similar to that of the bricks to which it is applied. Depending on the nature of the bricks, the coating may be acidic, basic, or neutral. It is necessary, also, that the coating should form a good bond with the bricks.

Information is given as to the composition, uses and manner of application of a very large number of the best known proprietary mixtures employed in Great Britain, Germany, and the United States of America as protective washes on refractories or as pointing or patching cements. The ingredients of these mixtures are very varied and range from natural siliceous and argillaceous minerals to such specialities as silicon carbide, corundum, zirconia, diaspore, and chromite. A description is also given of several types of spraying machines and guns which are employed in applying the materials, and a very extensive bibliography of the subject is appended.

GAS SERVICE - - -

Discussed from the viewpoint of the Gas Salesman

Selling Industrial Gas.

The Midlands Circle at their last meeting had an admirable discussion based on a paper entitled " Selling Industrial Gas," by Mr. H. R. Hems, of the Industrial Heating Section of the Birmingham Gas Department. Mr. Hems dealt with his subject comprehensively, yet concisely, and the full report in the June " Gas Salesman " should prove extremely useful to undertakings which are, as yet, not so highly developed in this direction as Birmingham.

Primarily, said Mr. Hems, in the successful selling of goods or utilities, comes the question of quality. For the Gas Industry, it may generally be claimed that we are selling a commodity of uniform quality, varying slightly according to the districts in which it is supplied, and again, the majority of undertakings offer gas at as uniform a pressure as is possible, pressures really being linked up with quality where gas sales are concerned.

Next comes the question of price. Cheap fuel is essential to industry. Cheap gas is therefore essential to industry generally, the Gas Industry, and the Nation. Each gas undertaking has to decide for itself which method of charging best meets its particular condition, and whether it shall be on a sliding scale, quantum, or multi-part tariff basis. The last-named method seems to offer the most satisfactory method, as it is sufficiently flexible to allow for all conditions of demand. Many undertakings, both small and large, are being offered increased loads which can be obtained only on a low price basis, and where works and main capacities allow, it is undoubtedly good business to obtain certain of these loads at prices nearing manufacturing costs *plus* a small profit.

Competition, and How to Meet it.

The competition which has to be met in the industrial field Mr. Hems analyzed as follows:

Heat units in solid fuel form are cheap, but in the majority of instances cannot be used efficiently, and are now hardly considered for the smaller sizes of furnace except where gas is very expensive.

Producer gas, obtained from self-contained producers, can be combated successfully on a basis of efficiency of utilization, and also on cost where town gas is charged on a reasonable basis.

Competition with fuel oil can be met in a large number of cases by careful attention to the efficiency of the gas furnace, by taking advantage of the possibility of the more direct application of town gas to many processes than is possible with fuel oil, and by a careful valuation of labour and plant maintenance charges with the latter. When, however, the application is purely a question of heat unit transfer from flame to the article to be heated, then town gas can only compete on a price basis slightly above that of oil. It is generally conceded by manufacturers that town gas is worth a slightly higher charge even for this class of heat application.

Electrical energy as a fuel has the advantages of flexible method of charge, high efficiency of utilization, and ease of control, but, with the exception of certain special applications which belong to electricity alone, town gas, in modern types of furnaces well insulated and fitted with automatic control (thereby taking away from electricity one of its main attractions) can hold its own successfully.

Without going into extreme details of relative costs it is safe to say that, to compete, town gas needs to be supplied at a figure approximating 4d. per therm (1s. 6d. per 1000 c.ft. of 475 gas), except where local or special process conditions justify a higher or necessitate a lower price. Unfortunately, comparisons of running costs are frequently made with old type gas furnaces and new designs of the competitive plant. It is up to gas salesmen to remedy this. Never belittle your competitor. Get all the facts of the proposition from your side and as much information as you can on the other, and meet competition squarely. Incorrect information, whether of cost or process, may obtain a consumption, but will never retain it.

Consolidating the Industrial Load.

After referring briefly to the Department's 4000 consumers using gas for industrial purposes apart from power, and taking approximately 3000 million c.ft. a year, Mr. Hems continued:

It was therefore very surprising to the author, on investigation some five years ago, prior to the launching of an industrial service scheme in Birmingham, to find that we were only certain of about 10 per cent. of our industrial consumers being aware of the services which the Special Industrial Section inaugurated for their benefit had to offer. We had in mind at that time consolidating our industrial load, and also commencing a survey of factories where gas was not used, in order to bring in new business, though we have never progressed further than the consolidation part of the scheme. One man was detailed to begin on the scheme, with instructions to visit every industrial consumer, to inspect apparatus, and to suggest improvements and economies, and, of course, to discuss possibilities of new business. The visit of the special representative was notified to the consumer by an ordinary typed and signed letter from the Department. These were easily handled by a typist and justified themselves by the large number of replies, welcoming the proposition and suggesting appointments. A new card system was put into operation, recording the information obtained by the special representative on each survey carried out within the consumer's premises. Running concurrently with the card is one giving the quarterly consumption of the consumer.

We have completed one survey of all the industrial consumers, and are now engaged on the following-up survey, and can look back on the results obtained with satisfaction. Summarized, these are as follows:

A fairly complete record of the number and types of furnaces and industrial apparatus in use in the area, with particulars of gas systems used—high pressure, low pressure, or air blast.

Sale of apparatus to an appreciable amount.

Valuable increase in gas consumption.

Knowledge that our industrial consumers are aware of the services we offer.

Repair and modernization of many furnaces carried out.

Replacement of many obsolete furnaces.

Placing of particulars of the latest types of plant before consumers.

Advice, Installation, and Repairs.

Such a scheme of consolidation of existing industrial load, excellent though it may have proved, and strongly as we recommend any gas undertaking coming to us for advice to put it immediately into operation, is valueless without the work of a competent staff of industrial gas engineers engaged on the advisory and installation work, maintenance, and repairs work, and particularly the experimental work, both before and after installation, together with the necessary demonstration plant, each of these being of great value in the whole scheme. The large undertaking can assist the smaller in the provision of the last mentioned requirement.

The author strongly recommends co-operation with the makers of gas furnaces, and deprecates any attempt on the part of gas undertakings to build furnaces where satisfactory standard types are available. Further, every gas undertaking should reserve to itself the right of selecting the most suitable apparatus to meet a particular inquiry from the furnaces and apparatus made by any furnace maker. If nothing satisfactory can be obtained, then it is up to them to design and build suitable apparatus. In Birmingham we undertake the repair of any make of gas furnace. We claim that, using the best quality materials and supervising workmen during the actual repair, we are in a position to offer a service which is of the utmost value to the manufacturer and to ourselves, as it enables us to be quite certain that a furnace is in the best condition possible for the efficient use of the gas consumed.

A Few General Hints.

A gas salesman should never say that he has no industrial load in his area. Look for it. It is to be found in the most unlikely places. In any case, the industrial side is well worth study. You may get on to an industrial district one day.

An excellent method of selling, providing the capital cost is not too heavy, is by installing furnaces, small appliances, and incidental apparatus such as pyrometers or simple thermostats, on the understanding that they are returned if satisfaction is not given. You make the consumer realize that he cannot do without them. We have been particularly successful in selling pyrometers and such apparatus incidental to industrial gas usage when loaning for lighting up and testing a new furnace after installation.

Enthusiasm is essential if the industrial gas salesman is to be successful. Selling industrial gas with its changes of propositions cannot help but create enthusiasm.

THE NEWS OF THE WEEK

The Warrington Corporation Gas Committee have reduced the price of gas from 3s. 4d. per 1000 c.ft. to 3s. per thousand.

The Output of Gas from the works of the Société Roubaisienne d'Eclairage par le Gaz et Electricitè of Roubaix, France, has so far only been slightly affected by the general industrial depression having fallen only from 4148 million c.ft. in 1929 to 4112 million c.ft. last year.

Among Recent Inventions there appears one of interest to those who purchase or manufacture wrought-iron fittings. It is a testing apparatus, and the novel feature is the combination of a chair setting with an overhead fixture carrying the sealing face, which is operated by means of a screwed spindle. The Glasgow Corporation Gas Department have adopted it, and it is proving very successful in the tube testing department, where the patentee, Mr. J. Dunlop, is employed.

The Port Talbot Corporation have decided to lay down eight new vertical retorts, with other plant, and generally to modernize their gas-works at a cost of £15,637, and the tender of Messrs. West's Gas Improvement Company was accepted in respect of the eight vertical retorts at a cost of £12,387. The Mayor pointed out that this would mean the wiping out of the old Margam Gas-Works, and that sufficient gas would be produced by the new plant to keep the town going without having to resort to other concerns for a supply. The work will be proceeded with immediately.

Advertising and Trade Development.

Sir Francis Goodenough, C.B.E., President of the Incorporated Sales Managers' Association and Chairman of the B.C.G.A., delivered an address at the Opening General Session of the Seventh Annual Convention of the Advertising Association, which was held at Glasgow on Monday, June 22 last.

There is, said Sir Francis, more need to-day than ever of hard thinking, long-sighted planning, and intensive effort by everyone of us if we are to emerge from our present gloom into the sunshine of security and progress. Are we, even now, doing that thinking and planning, all of us?

Nothing has struck me more during the past two to three years in my investigation of evidence of many kinds from many parts of the world of the marketing shortcomings of some of our traders (of some, please note, not of all)—nothing has struck me more than the lack of thorough, detailed, organized exploration of the needs, habits, tastes and fancies of the customers in the multifarious markets of the world—exploration, if you please, on the spot by those able to read, write, speak, and readily understand the language of the inhabitants—followed by the production of goods and services, and the organization of skilled marketing forces, accurately designed to secure those inhabitants as customers and to please, satisfy, and retain them.

Shortly, our weakness has been the lack of systematic investigation, systematic thinking, systematic planning and organizing that are all essential in their proper order to the success of industry and commerce. Put another way, there has been too much reliance upon the casual, the haphazard, the trial-and-error methods that served us without disaster in the days of Queen Victoria but lead straight to it in these days of intensive competition from all quarters of the world.

To mention another point which our evidence suggested to us is calling for planning instead of muddling, a very promising means for getting work for our unemployed is to be found in co-operative overseas market research followed by co-operative marketing by groups of non-competing traders, in place of individual effort by those unable to afford to do the work on an adequate scale by competent people adequately paid. What is being done about it? Have our great trade associations any well-thought-out plans for bringing it about? Are we all waiting till we can afford to do it—which would mean until we no longer needed to; and that would very likely then be never?

Allied to trade development by co-operative market research and co-operative marketing by groups of trades, is another question, one most germane to this Convention, the question of trade development by co-operative (as well of course as by individual) advertising.

Let me sum up my remarks in one concluding question, and one concluding suggestion. Russia has her Five-Year Plan for her trade development—and, incidentally, for our trade diminishment. Have we, each and everyone of us, any definite, comprehensive, four-square, progressive plan—be it 5-year, or 5 months, or 5 weeks?

I suggest that it is time that—not here and there; not as brilliant exceptions, such as some of our leading business houses present, but everywhere, as a matter of national habit, national policy, and national pride, we should cease once and for all to rely on "muddling through," and should set about thinking through, planning through, working through—and so, surely and truly and deservedly, winning through.

University of Leeds: Department of Coal Gas and Fuel Industries.

Examination Results, June, 1931.

Ph.D.—A. H. Eastwood, B.Sc., Thesis on "The Influence of the Inorganic Ash Constituents on the Liberation of Nitrogen as Ammonia during the Carbonization and Gasification of Coal."

M.Sc.—J. J. Priestley, B.Sc., Thesis on "A New Process of Low-Temperature Carbonization of Coal."

B.Sc.—With 1st Class Honours, Leblanc Medal.—T. H. Blakeley, B.Sc., for two Theses, "The Thermal Conductivities of High-Temperature Heat Insulating Materials," and "A Form of Nomogram for Expressions containing more than Three Variables."

B.Sc., Ordinary.—J. E. Knight, G. A. Thompson.

Diploma in Gas Engineering.—H. G. Simpson, Ph.D. (London).

Penistone and District Gas Company's Rating Valuation.

A proposal for amended rating valuation made by the Penistone and District Gas Company came before the Staincross Assessment Committee at Barnsley on June 25. Under the Rating and Valuation Act, 1925, the assessment in the four parishes supplied by the Company had been fixed at an aggregate of £570, against which a proposal for a total value of £267 was submitted by the Company.

Mr. J. H. Brearley, M.Inst.C.E., of Harrogate, appeared for the Company, and urged as one of the reasons for the proposed reduction the diminished consumption of gas (12·71 p.ct.) consequent upon the complete closing down of the engineering works of the English Steel Corporation, formerly Messrs. Cammell Laird & Co., Ltd. Mr. G. H. Wilby, Rating Valuer for the local authorities, put in a valuation of £798. There were wide divergences of view between the valuations of the respective sides in the matter of tenant's capital and allowance thereupon. After a protracted hearing, the Assessment Committee decided to reduce the rateable value to £400.

Gas Lighting in Bergen.

Last month, the Bergen Gas-Works celebrated the 75th anniversary of its inauguration. It was on June 24, 1856, that the first gas lamps were lighted in the town; and in spite of the fact that electricity is generated by water power, gas is still dominant for street lighting.

An esteemed correspondent from Bergen writes to ex-

THE NEWS—continued.

plain to us that eight or ten years ago everybody was convinced that street lighting by gas would be a thing of the past within a few years. But, by adopting the most up-to-date lamps and fittings available, the gas-works not only succeeded in maintaining their street lighting, but increased the number of lamps and the candle power. While, in 1923, there were 1438 public gas lamps with a total candle power of 167,865, there are now 1531 public street gas lamps with a total candle power of 426,320. Gas is without doubt today superior to electricity for street lighting purposes, even in a place like Bergen, where electricity is cheap and plentiful.

It is another noteworthy fact that the public, which for a number of years have been using electricity on a lavish scale for household purposes, are beginning to realize that gas, after all, is the mainstay in the kitchen—so much, indeed, that while the Bergen Gas-Works are maintaining their position, and even calculate upon a slight increase, the Electricity Works have suffered the disappointment of having to reckon with a slight set-back.

An Audacious Statement.

Those families who have the smallest annual expenses—writes a correspondent—do not use electricity for cooking, but gas only. This relates to a town where electricity costs practically the same as gas, heat unit for heat unit. Practically every household in Bergen is using both gas and electricity for cooking purposes, but the public are gradually beginning to realize that, in order to obtain greater economy, they must decrease their electrical consumption and increase their gas consumption.

"It certainly seems strange to me," observes our correspondent, "that electricians in a country like Great Britain, where electricity generally costs more than gas, heat unit for heat unit, still have the audacity to claim that all-electric houses can compete in cheapness with gas."

South Metropolitan Co-Partnership Festival

Brilliant weather and a very wide programme of activities marked the occasion of the annual co-partnership festival of the South Metropolitan Gas Company, held at the Crystal Palace last Saturday, June 27.

After an afternoon devoted to sporting events of all kinds Dr. Charles Carpenter, C.B.E., the President of the Company, addressed the co-partners in the Palace at 7 p.m.

Dr. Carpenter said: "As President of the South Metropolitan Gas Company, one of my dutes, and not the least happy one, is to act as host to-day at this the annual festival of a co-partnership which has now existed between employer and employed in this Undertaking for close on forty-two years. Those of you who can look back over this period of time cannot but be struck with the changed conditions which in this interval have come about in the relations between what is called capital and what is called labour. It would be no exaggeration to say that these relations before the Board of Directors took the momentous step it did in 1889 were largely coloured by suspicion and ignorance, the one an outgrowth from the other. The remedy for that condition of things has been proved to be co-partnership; and although nothing is perfect, or likely to be perfect, in this world, it is no longer the fault of the system of employment if the employee feels otherwise than that he has a friend in every member of the Board of Directors, or that they, in turn, have any doubt that it is their friends they meet upon this annual day of rejoicing.

But a business needs something more for its continued progress, or even for its continued existence, than a body of contented employees, and although we are what is known as a statutory undertaking, we are no exception to that requirement. Our business is one that has many ramifications. We are designing and constructing engineers; we are scientific investigators; we assemble in whole or part appliances used by our customers; we are chemical manufacturers; we buy and sell solid and liquid fuel; but the whole of these operations rest upon one foundation, and one foundation only, and that is the monopoly of supplying gas (and remember that I speak of gas, not of energy or fuel) in an area which Parliament has defined for us, surrounding privileges we enjoy with restrictions and regulations. Among these, it has strictly limited the profits which you and other shareholders are allowed to receive upon the money, whether acquired by your own labour or by heritage from others, which you have invested in this business, and without which it would never have achieved the important position it now occupies. For please bear in mind that although it is a fact that there are in this country large municipalities carrying on the business of gas supply, it must not be overlooked that it was not until the whole of the pioneer work of establishing the Industry was completed, that they turned, I think I might say, envious eyes to the works established by the gas companies in their midst, sought for, and obtained, authority to purchase their statutory rights.

A Flourishing Industry.

The Gas Industry in which you and I are so deeply interested and with which we are so largely concerned, has flourished. I am proud to say, for well over a century. And now it looks as though a Minister of the Crown had set himself the task, not of letting it by its own obsolescence and business competition die a natural death, but of uprooting it to make room for another more showy growth in which he is interested. I am not going to weary you today by quoting my authorities for this statement. My object in directing your attention to this new phase of the competition we have to meet is to remind you of the important part each and every one must perform if our progress—I might go further and say our stability—is to continue.

All over our district there are offices, works, and depôts in which our co-partners follow their task and carry out their duties. But if they are to maintain the continuity and stability of their employment, they must not say goodbye to it when the clock or the bell marks the conclusion of their routine labour until the next morning's call. I am convinced that to-day we need not only good co-partners, but good citizens also, and by good citizens I mean men, and women too, who will, however onerous their tasks may appear, take an interest in municipal affairs. I remember the time when the great bulk of the Gas Company's officials and employees lived near their work. Since that time there has been more or less an exodus from its vicinity to outlying suburbs and, indeed, to the country beyond. But a change of that attitude is imperative to-day. Our business will progress the better if our employees are not only workers but dwellers in, as far as possible, the areas where they earn their livelihood.

Just over a year ago the Board decided to mark the occasion of the completion by a co-partner of twenty-five years' service with the Company by the presentation to him of an illuminated certificate recording the fact. The distribution of these certificates took place early this year, and in all about 1700 were awarded. The numerous expressions of appreciation which have been received have been most gratifying, and the pride felt by the recipients is a very creditable and real one. To have served an undertaking faithfully and well for twenty-five years is undoubtedly a very worthy achievement. Not every commercial undertaking is able to offer continuous employment over such a long period to so large a proportion of its employees, and while a natural pride is properly taken in faithful service, I believe gratitude no less sincere is felt towards an undertaking which is able to offer such continuity of service."

In conclusion, Dr. Carpenter said that it was now 22 years since he had taken upon himself the responsibilities of the Chairmanship of the Company, and the co-partners of that time showed their appreciation of what they thought he had done for them in the long years of his life that had passed by presenting him with an autographed album which not only contained the signature of every co-partner in the service at that time, but was prefaced by a message in letters of gold, which was deeply appreciated by him. He would have been content with that expression of feeling and affection, but the co-partners had chosen once more to place him in the difficult position of adequately expressing his thoughts. He had received that day from the Chairman of the Co-Partnership Committee a beautiful silver bowl of workmanship carried out something like 150 years ago, and this would remain for him and his wife during their lifetime an object to be looked upon as a "thing of beauty and a joy for ever." He thanked them not only for the gift, but for the charming, graceful, and beautiful way in which they had arranged all the details from inception to presentation.

NEW GAS-WORKS AT MOSSLEY

Inauguration by the Earl of Derby, K.G., P.C., G.C.B., G.C.V.O.

The New Gas-Works which have been installed by the Mossley Corporation were formally opened by the Right Hon. the Earl of Derby, K.G., P.C., G.C.B., G.C.V.O., on Monday, June 22. There was a very large attendance of visitors, representing both technical and municipal interests, among whom were the Mayors of Mossley, Oldham, Stalybridge, Dukinfield, and Ashton, as well as Chairmen and members of numerous local Councils of the Counties of Lancashire and Yorkshire. Most of the gas undertakings of Lancashire and Yorkshire were represented by the Chairmen of the respective Committees controlling them and by their Gas Engineers. The cost of the new works is approximately £130,000.

Opening Ceremony.

Alderman James Alfred Bottomley, J.P., Mayor of Mossley, in expressing his sense of the high honour paid to the town of Mossley, and to himself personally, as its Chief Citizen, by the presence of Lord Derby at the works, mentioned that it was fifteen years since Lord Derby had paid them a visit. They were very deeply indebted to his Lordship for the help he was extending to them all upon this occasion.

Alderman John Ogden, J.P. (Chairman of the Mossley Corporation Gas Committee), also expressed the great pleasure he felt at the fact that Lord Derby had consented to open the new works, and also that so many people were present who had been of assistance to the Corporation during the necessary negotiations for their erection. It was pleasant to notice that some of the contractors who had not been successful in competing for a share in the construction of the works were also present, thus showing the good feeling that existed on their part. He had very great pleasure in presenting to Lord Derby a gold key with which to open the engine house door.

The Earl of Derby, K.G., in formally opening the works, thanked the Corporation of Mossley for the gift of the key, and also expressed his deep appreciation of the honour paid to him in being asked to declare the works open for the service of the public of Mossley and the surrounding district.

In opening the door of the new gas-works, he formally consecrated it to the service of the municipality and of the surrounding district. He wished that the inauguration of this new enterprise would herald a new dawn of prosperity to the district. (Cheers.)

Councillor Major R. B. Glover, in proposing that a most cordial vote of thanks be accorded to his Lordship for opening the works, said they were all conscious that there was no parochial obligation so small, and no national or imperial duty too big, for him to fulfil.

Councillor Percy Ogden, in seconding the vote of thanks, said that the presence of Lord Derby in Mossley would give to the town that little fillip of encouragement of which it was so badly in need, and which, he had no hesitation in saying, it so richly deserved. He was convinced that the new works would continue to function for the benefit of the inhabitants of Mossley and the district long after the last instalment of interest and sinking fund had been paid off, notwithstanding the great expenditure which had been incurred. He further maintained that those Gas Committees who kept pace with the times, and who brought their plants up to the standards of modern requirements, would be in a position to compete with electricity all the time. We did believe that gas and electricity ought to be in competition with one another; particularly when both undertakings belonged to the same Corporation or the same syndicate. But, there was no doubt that gas plants would have to be kept strictly up-to-date.

The Earl of Derby, in responding to the vote of thanks, said he did not feel disposed to enter into any argument as to the relative merits of gas or electricity. Suffice it to say that he hoped they would all approve of the new buildings and the new works which had been created; because he hoped they would be for the benefit of all.

Councillor Miss Chapman, in proposing a vote of thanks to the Mayor of Mossley for presiding over the proceedings, and to the Chairman of the Gas Committee, Alderman John Ogden, for his services in connection with the new works, also presented two silver replicas of the gold key used for the opening ceremony to those gentlemen.

Councillor Robert Taylor seconded the vote, and the proceedings of the formal opening ceremony then concluded.

The Works Described.

The following notes are from an elegant, profusely-illustrated brochure descriptive of the Mossley Corporation Gas Undertaking.

The old works, originally belonging to the Stalybridge Gas Company (formed in 1928) were built in 1862, Mr. Geo. Emmott, then Gas Engineer of Oldham, being responsible for the design and carrying out of the project.

In 1884 the Company obtained a Bill for further powers. While the Bill was before Parliament an agreement was made between the Company and the Corporation of Stalybridge and the Local Board (as it then was) of the district of Mossley for the purchase of the undertaking of the Company by Stalybridge and Mossley; and in the year 1885, pursuant to that agreement, a Bill was passed by which the whole undertaking was passed to these two towns and divided between them. The Corporation of Stalybridge took its part and Mossley took its own district.

The district supplied by the Mossley Corporation includes Mossley, a portion of Springhead, Greenfield, Uppermill, Dobcross, Diggle, Delph, and Denshaw, the six latter forming the Urban District of Saddleworth. The greater part of the area consists of moorland running up to nearly 2000 ft. high. It is, of course, impossible to supply gas to the whole area, but gas is supplied to people at a height of over 1000 ft. above the sea.

The first complete year of the Corporation's ownership of the works was in 1887, the gas sold at that time being 36 million c.ft. in Mossley, and 24 million c.ft. outside Mossley. In 1930-31 the gas sold in Mossley was 77 million c.ft., and in the outside area 103 millions.

In 1923-24 the question of providing for future requirements of carbonizing plant became pressing. In 1925 the Council's Gas Engineer, Mr. Wm. Bennett, suggested that the Gas Committee should proceed at once with the erection of new works on the Roaches Site adjacent to the L.M. & S. Railway. After a searching inquiry the Mossley Council came to the conclusion that the course suggested was the right one, but heavy legal expenses were incurred by reason of the continued opposition of the Saddleworth and Springhead Urban District Councils, the case being finally disposed of by the House of Lords Committee, final session 1926, when the appeals of the Saddleworth and Springhead Urban District Councils were rejected on all points. The scheme was finally approved by the Ministry of Health, and the Unemployment Grants Committee sanctioned the payment of one-half the interest on approved loans (less certain sums to cover immediate requirements) for a period of fifteen years.

The site chosen by reason of its uneven character was not a good one, but it was the only one available adjacent to the railway in the Borough of Mossley, and there was a natural disinclination on the part of the Corporation to build works outside its own rateable area.

It was decided to level the site to rail level. This entailed the excavation of 113,000 cubic yards of clay, 91,000 cubic yards having to be removed from the site and tipped on a piece of land 600 yards away, this land being purchased for the purpose.

A Ruston bucket caterpillar navvy was purchased from the makers for carrying out the excavation, and 1 cub. yard jubilee wagons on 2 ft. gauge rail track hauled by petrol locomotives transported the excavated material from the navvy to a central loading station on the site, whence it was conveyed by means of a "Breco" aerial ropeway to the tipping site.

The wire ropes originally put on carried through the whole of the job and were in quite good order when taken off. These were supplied by Messrs. Glover Bros. (Mossley), Ltd., of Mossley.

In the development of the site it was necessary to take down a brick and stone railway bridge, spanning the main line, to divert a public footpath running across the site and to erect a new concrete bridge spanning the main line and the private sidings at a point 59 yards away from the original bridge. The parapet walls of the old bridge were taken down by hand, and the arches were demolished by

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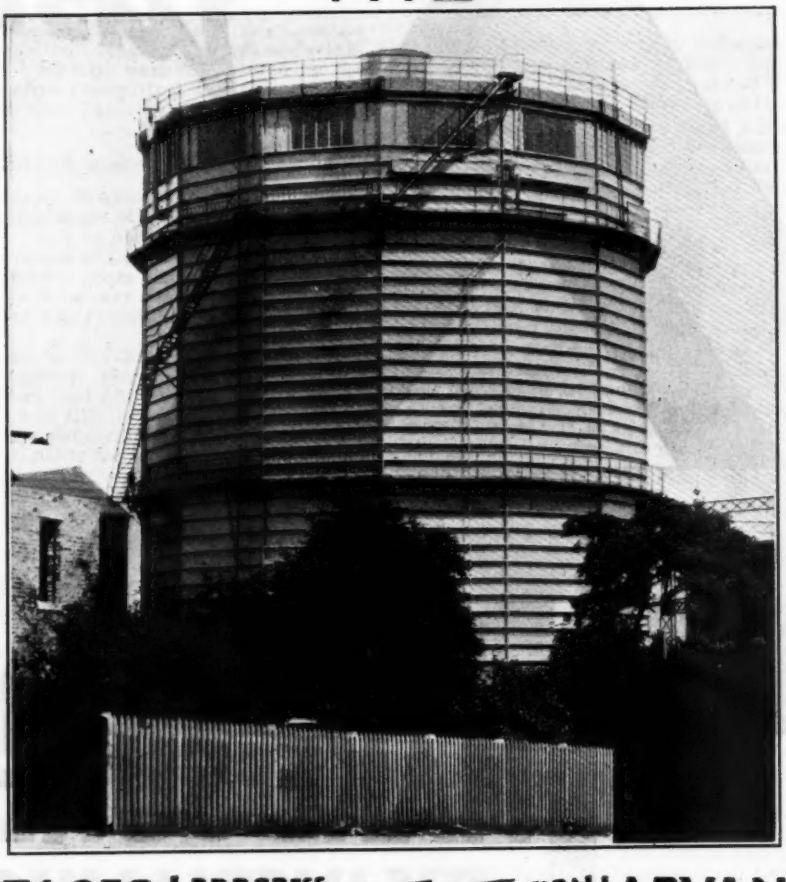

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1. DRIER GAS.
2. PRACTICALLY UNIFORM PRESSURE.
3. ELEVATED FOUNDATIONS EFFECT UTILIZATION OF GROUND SPACE.
4. REDUCED PAINTING COSTS.

PROGRESS v TRADITION

When George Stephenson proposed the improvement of locomotion by the application of steam in 1810, he was derisively opposed. His opponents said "the old way is better." All progressive achievements have been attained in face of this British conservatism. The Englishman's trait forbids him to accept an invention until its advantages have been indisputably demonstated. So the history of the inception of the "Waterless" corresponds with the traditions of the past, but like all great inventions, it has eventually triumphed over this conservatism and become an essential part of Modern Gas Plants.

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dynamite and fuses. A new concrete bridge was erected by Messrs. Lotz & Kier, of Stoke-on-Trent.

The site is bounded on the S.W. by a main road (Manchester Road), this road having an incline of one in 24. It was thus necessary to build a retaining wall on this side or form an embankment. A retaining wall was decided upon. This is 714 ft. long, varying in height from 30 ft. to 6 ft. On the N.E. side the site is bounded by a row of cottages at a height varying from 23 ft. to 10 ft. above works yard level. A retaining wall with surcharged embankment was built on this side.

The site being at main line level enabled level railway sidings to be laid down. The private sidings are laid out to enable wagons to be brought in or out from either end. This work was carried out by Messrs. A. Monk & Co., Ltd., of Warrington, the junctions into main line and the erection of signal box, &c., being carried out by the L.M. & S. Railway Company. Accommodation for 74 wagons is provided. The Gas Department's own steam locomotive supplied by Messrs. Peckett & Sons, Ltd., of Bristol, carries out all shunting on the private siding.

The wagon tippler is of the rotary type, made by Messrs. Strachan & Henshaw, Ltd., of Bristol, and embodies the "Whitehall" patent clamping mechanism. The clamping is automatic, the clamping members being brought into action by the rotation of the rings and released by the reverse motion. Wagons varying from 10 tons to 20 tons capacity can be dealt with.

We attach (states the writer) importance to blending, enabling us, as it does, to utilize coals we could not otherwise use; blend our breeze with caking coals, forming the breeze back into coke; vary at will the nature of our coke, leaving even by high temperature carbonizing methods a uniform and sufficient volatile content in the coke to form an easily ignitable fuel for domestic purposes equal to low-temperature fuel; to increase if desired the gaseous output from the plant or the gaseous or other products yields per ton of coal; or obtain the yields from the most economic blends taking values into consideration. It will be gathered that normally coal is not delivered direct from wagons to retort house bunkers, but is first sent to the store. While this entails double handling, the cost of handling is extremely low, and the financial benefits of blending weigh heavily in its favour.

The electrical equipment of the whole coal handling plant was supplied by Messrs. Metropolitan Vickers, Ltd., the switch gear being arranged in a separate house near the wagon tippler.

The motors are of the totally enclosed squirrel cage type, except in the case of the wagon tippler. They are designed for use on a three-phase, 50 periods 400 volts circuit, and are continuously rated with a temperature rise of 50° C., and are capable of carrying 50 p.ct. for one minute, and 100 p.ct. overload for half-a-minute.

The complete coal handling plant has been supplied and erected to the Gas Engineer's designs by the Birtley Company, Ltd.

"Exmet" reinforcement is used in the retort house.

Carbonizing Plant.

The choice of carbonizing plant is at all times one requiring careful thought. We inspected all kinds of plants and sytems both at home and abroad. On a free open site such as we now had, with close proximity to Lancashire and Yorkshire coalfields enabling us to purchase delivered low-priced clean slack coals, our first tendencies were favourable to horizontal retorts. Ten years' experience in carbonizing various blends in a limited way on our old works had convinced us of the great advantages of blending with static charges both in increasing gas and products yields and by blending low-priced non-caking coals with high caking value coals to produce good cokes. In the design of the new works it was decided to elaborate the blending process in order to carry out fully the principles of scientific blending. We believe that the future of the Gas Industry lies as much in supplying a clean free burning solid smokeless fuel as in supplying gaseous energy, and that such a fuel suitable for ordinary domestic grates can be produced by the present high-temperature methods of gas-works, providing suitable blends are carbonized. Our experience of continuous vertical retort carbonization did not inspire us with confidence in regard to the economical carbonization of cheap clean slack coals by this system, nor did it lead us to believe that a dynamic charge was so good as a static charge for the knitting together of cokes from blends. In all continuous vertical carbonizing systems (some more than others) there is a period through which the coal passes where it is being subjected to a gentle preheating which tends to lessen its coking qualities and thus reduce its usefulness for blending with non-caking or low caking value coals. Indeed, one well-known system accentuates this tendency for the purpose of reducing the coking properties to prevent swelling, and so avoid the necessity for periodic rodding of the charge. The result is that low caking value coals which will yield a coke when carbonized as a static charge will not coke in continuous vertical retorts, while high caking value coals give trouble through difficulty of movement through the retort and sealing off the gas way, requiring excessive rodding. Blending of coals in this system is more likely to be adopted for giving ease in working rather than obtaining the most economical all-round results. We were favourably impressed with the intermittent vertical retort system with the advantage it gave for the production of water gas by steaming the charges, and its retention of the advantages of static carbonization. It had, however, disadvantages in its method of charging, causing large volumes of dust and smoke on the top stage and having to deal with large charges of hot coke in bulk at the discharge end. An examination of tenders revealed that the capital costs in all three cases, horizontals, continuous verticals, and intermittent verticals, were about the same, labour charges were as low in horizontals as with the other two, while horizontals gave us absolute freedom in choice of coals, and in the matter of repairs and renewals.

We came to the conclusion that we could not improve, under our local conditions, on the modern horizontal system with a really up-to-date coke handling plant. The carbonizing plant consists of a retort bench of seven arches, each arch containing a Drakes patent regenerator furnace and setting of their latest type, the producer being 14 ft. from floor to floor, and fitted with their patent hanging bar grate, giving a grate area of 25 sq. ft., equal to 1·25 sq. ft. per ton of coal carbonized in 24 hours. Each arch contains 10 silica segmental retorts of the Oughtibridge Silica Firebrick Company's manufacture, 24 in. by 18 in. in section by 24 ft. 6 in. long. The cubic capacity of these retorts is believed to be the largest in the world. We had in view installing retorts at least 3 ft. longer than this, but later decided that advance in this direction should be gradual. The strength of the column of coke to withstand the initial thrust of the ram in overcoming starting friction is the main deciding factor limiting the length. Our observations of the working of the 24 ft. 6 in. long retorts confirms our view that much longer retorts than these can be installed with satisfaction. Any increased length is, of course, in the middle, away from the radiating influences of the outside walls, the extra coal being carbonized with very little increase of fuel. The settings are constructed in such a manner that we have no difficulty whatever in maintaining a high uniform temperature throughout the length of the retort, and they are easily capable of carbonizing maximum charges in 12 hours. The whole of the bench top is insulated with Moler bricks and the front walls of the setting are insulated with Dicks anti-thermic bricks, thus conserving the heat to a considerable extent and effecting a large saving in fuel consumption.

The charging machine was made and supplied by Messrs. Aldridge & Ranken, Ltd., of Bath and London, and is of their most modern, simultaneous type embodying all the latest improvements. This machine was chosen for its cleanliness, ability to deal with all classes of coal, and in view of the gas offtake being at one end of the retort only, the fact that the method of charging by this machine at all times ensured a free space above the coal was an advantage. The machine is driven by two electric motors of British Thomson-Houston Company, Ltd., manufacture, one for charging and raising motions and one for the travelling motion.

Improved Congdon System.

The coal gas is conducted from the retorts by means of the Congdon pipes. Five retorts discharge their gas through individual disc valves into one common vertical pipe. Here we depart from the common Congdon practice. Instead of the gas passing into a rectangular chamber meeting liquor passing over baffle plates, we cause the gas to cling to the periphery of the pipe in the scrubbing portion. The liquor at the same time runs down the periphery of the pipe. We thus get a thorough cooling and scrubbing effect, in addition to which the gas is made to enter and leave the scrubbing section by having to deflect the periphery of an umbrella of liquor against the inside circumference of the pipe. It is thus divided into a fine film, the tar being brought down with the liquor. With liquor at a temperature of 55° Fahr. entering the pipes, all the tar in the gas has been brought down at the Congdon pipes in the retort house by means of these umbrella sprays (invented by the Corporation's Gas Engineer, Mr. Wm. Bennett), the temperature of the gas in the foul main being reduced to 80° Fahr.

We have, however, found great difficulty in cooling the liquor, and this problem is now being tackled. At present liquor is entering the Congdon at a temperature of 130° Fahr., and 85 p.ct. of the tar is being brought down at the Congdon seal pots. One remarkable fact discloses itself—the naphthalene content of the purified gas is as low as 1 grain per 100 c.ft. Whether this has been brought

about by the thorough scrubbing action in the Congdon, we do not know. This is being investigated.

In our inspection of Congdon systems installed at other works we were not impressed with the idea of having the tar and liquor separating and liquor circulating tanks with circulating pumps in the retort house. We have kept the retort house free from all these things. The tar and liquor from the Congdon are conducted through a cooler to No. 1 Tar and Liquor Well in the yard. This well is constructed as a well within a well. The tar and liquor flow to the centre well, the liquor overflowing to the outer ring, whence it is circulated back to the Congdon system.

Each vertical Congdon standpipe may be isolated at the top by means of special disc valves similar to those in use on Woodall-Duckham vertical retorts. An auxiliary valve enables any five or multiple of five retorts to be connected up to a test main leading to a test plant, so that the make from half or one or more beds of retorts may be tested. Similarly the tar and liquor from any of the Congdon scrubber standpipes may be diverted to the test tanks. The crude gas collects in the 20 in. foul main, and then passes through a Braddock retort house governor.

Condensers.

These consist of an installation of "Eclipse" vertical water-tube condensers built in two units, each consisting of a cast-iron tower approximately 28 ft. high. The condensers have a capacity of 3 million c.ft. per 24 hours, and have a water-cooled tube area of 9000 sq. ft. The plant is provided with Clapham patent "Triumph" reversing valves.

Exhausters.

The exhausters, two in number, are of the Bryan-Donkin four-blade type, each capable of passing 80,000 c.ft. of gas per hour against a pressure difference of 45 in. W.G.

The tar extractor is of the Pelouze & Audouin type supplied by Messrs. Clapham Bros., of Keighley. The static scrubber, made by Messrs. Bryan Donkin & Co., to the Mossley Gas Engineer's design, consists of a cast iron column in the shape of a series of spheres, inside which is a series of umbrella sprays of similar type to those installed in the Congdon scrubber standpipes. The sprays of liquor are caused to strike against the spherical sides of the column and then swing in towards the centre, the liquor from each upper spray falling on to the next spray below it, being converted into foam and carried to the periphery again. By the shape and nature of the spray the gas is caused to take a path in thin streams at high velocity up the periphery of the column and a thorough scrubbing action with the descending liquor ensues.

A "Triumph" vertical washer-scrubber is situated adjacent to the static scrubber, and was supplied by Messrs. Clapham Bros. It is a new departure of this firm. The machine comprises a tower 29 ft. high, divided into two sections, each section having five washing chambers, the centre portion containing an intermediate bearing accessible through hinged inspection doors. The washer is fitted with a central shaft suspended by means of a self-aligning ball-bearing thrust and journal bearing at the top, and similar roller bearings in the centre and immediately below the bottom of the casing. Each chamber has a liquor collecting tray over which is carried the scrubbing medium. The liquor is picked up from each collecting tray by a specially designed circulator mounted on the central shaft, and is projected over the whole surface of the scrubber filling. The drive is by means of a totally-enclosed steam engine fitted with forced feed lubrication, the transmission being by machine cut bevel gears working within a totally-enclosed gear box. Plate glass inspection windows are provided to each section, and the lubrication of all bearings is centralized on a panel at the base of the machine, the lubricant being fed into the system by a high pressure forced feed gun.

The purifiers were supplied and erected by Messrs. Clapham Bros. to the Gas Engineer's design and specification, and consist of four boxes, 30 ft. by 25 ft. by 6 ft. deep, each having four mild-steel covers fitted with "Eclipse" rubber joint and transported by means of a dwarf travelling crane mounted on roller bearings and operating on machined track cast on the purifier plates.

In the connections from the purifiers to the meter, which is situated in a meter house on the same area as the scrubbers, valves and branches have been provided for future gas dehydrating plant.

"Connersville" Meter.

The station meter is of the "Connersville" positive displacement type supplied by Messrs. W. C. Holmes & Co., Ltd., of Huddersfield. The capacity of the meter is 80,000 c.ft. per hour, and occupies 6 ft. by 3 ft. floor space and a height of 5 ft.

The compressors are of 12 in. stroke and of the horizontal steam-driven reciprocating duplex type, manufactured by the Bryan-Donkin Company.

All steam piping from boiler to plant is of the Unit Superheater and Pipe Company, Ltd., manufacture, and consists of solid hot-drawn weldless steel tubing fitted with mild-steel flanges, jointed with nickel alloy rings.

Coke Handling and Screening Plant.

The handling of hot coke from intermittent retorts is a problem. We examined many installations; we designed many schemes, but were not satisfied with any. We eventually heard of the Le Fleuve system then working at Rouen Gas-Works, and decided to inspect it. From what we saw there we were satisfied that this system, with some modifications, provided at once the simplest and all-round most economical method of dealing with hot coke. As installed at Rouen by M. L. Cros, the coke is pushed into a stream of water in a trough running in front of the retort bench, the coke being quenched and carried by the stream to outside the house, where it engages with a perforated flight tray conveyor which elevates it to a hopper or direct to lorries. From the hopper the coke is taken by a G.B. conveyor to the screens and storage hoppers.

We thought the system good, but there was a certain amount of backwash where the coke and water entered the flight conveyor, and this washed back some of the coke into the tank at the boot of the conveyor, and required a man in attendance from time to time. In our modified system the hot coke is discharged from the retort by means of a Fiddes-Aldridge stoking machine, the bottom two tiers of retorts direct, and the upper tiers through a Harrison type of coke bus (suspended on overhead rails), into the trough already described. This trough, in ferro-concrete, is continued, on emerging from the retort house, through an arc of 90° with a radius of 60 ft. The same fall is maintained outside the building as inside, but the top of the trough is kept level. The trough thus gets deeper as the discharge end is approached. Water at the rate of 1500 gallons per minute is pumped into the trough at the gable end of the retort house. The hot coke drops on this water, and is carried by it along the trough. The steam generated helps to keep the coke buoyant, and a steam atmosphere is generated above the coke, which helps to steam-quench the exposed hot coke (we think this is a distinct advance brought about by covering in the trough). The speed of the stream is such that the coke has no time to get over-quenched.

The complete coke handling plant has been designed by the Mossley Gas Engineer, and was supplied and erected by the Birtley Company, Ltd.

All the artificial lighting of the works, both inside and outside, is carried out by means of Keith-Blackman high-pressure lamps of 2000 and 1000 c.p.

The whole of the technical and supervisory work entailed in the carrying out of the scheme has been performed by the Gas Department's own regular staff under the supervision and direction of the Gas Engineer; but on the coke handling side acknowledgment is due to M. L. Cros, the Engineer and Manager of the Rouen Gas-Works, for the nucleus idea of the water carriage conveyor around which we have designed the plant as described.

Those present at the proceedings were subsequently entertained at dinner at the Mossley Technical School. The Mayor of Mossley presided.

The Toasts.

The Earl of Derby, in responding to the toast of his health, proposed by the Mayor of Mossley, said he was delighted to come among them that day, and to testify to his admiration of the pluck of a municipality which, when faced with conditions of great depression and hardship, nevertheless had the courage to embark upon such an important enterprise as their new gas-works. Unless they reduced the cost of production by some means, they did not stand much chance of being able to compete favourably with their competitors abroad. In that reduction, of course, municipalities could do something; it might not be much, but every little helped. By starting the new gas enterprise in Mossley the manufacturer was assisted. They could also assist him by keeping the rates as low as possible. By such means they would be doing something to bring back prosperity not only to their own municipality, but also to the country at large. Therefore, when he saw them encouraging any work which must be for the present and ultimate good of those who lived within the domain of Mossley, he was only too glad to come among them.

Councillor J. W. Greenwood (Chairman of the Stalybridge Gas Committee) proposed the success of the new works, and expressed the opinion that a state of healthy competition between the two services of gas and electricity would be beneficial to both.

Alderman J. Ogden, J.P. (Chairman of the Gas Committee), responded.

Councillor J. Buckley, in proposing the toast of "Our Guests," said that there were visitors in the room from practically all over Gerat Britain.

The Mayor of Oldham (Alderman Waterhouse) responded to the toast, remarking that Oldham were also embarking upon a

new scheme involving an expenditure of a quarter-of-a-million pounds.

THE GAS ENGINEERING PROFESSION.

Alderman J. H. WADDINGTON (Chairman of the Halifax Gas Committee) proposed the toast of "The Gas Engineering Profession," stating that there were less unemployed in the Gas Industry than in any other in the country. It was highly important that the women of the country should be educated in regard to the advantages of using gas.

Mr. J. H. CANNING (President of the Institution of Gas Engineers), in responding, said he was in agreement with Alderman Waddington's views that greater efforts should be made to interest the women of the country in the use of gas for domestic purposes. He congratulated Mossley upon its prudence and foresight in establishing the new works, which he was convinced would justify its existence by its results. The building of such a works was the best answer to those competitors who claimed that the days of gas were nearing an end. Provided there was fair competition, the Gas Industry had nothing to fear; unfortunately, as yet there had not been fair competition. He was very much afraid that the Government was finding that the electrical grid was a more expensive luxury than was contemplated.

Mr. WILLIAM BENNETT responded to the toast, and mentioned a number of statistical and other details in connection with the new works. He particularly appreciated the presence of so many of his engineering colleagues; particularly that of the President of the Institution of Gas Engineers, Mr. Canning, and the Vice-President, Mr. R. E. Gibson. The Mossley Corporation commenced their consideration of the question of the enlargement and modernizing of the whole gas-works in 1922. They considered the provision of vertical retorts, water gas plant, and the making of various alterations in regard to them.

The consideration of these schemes went on until 1925 when, having in view the Government offers of grants from the Unemployment Grants Committee, and the fact that they were spending £3000 per annum on transport, and also the general restriction with regard to the old works, he recommended the Committee to proceed with the erection of a completely new works on a new site.

The original site considered for its suitability was in the gas supply area, but outside the Borough, and the Council were naturally desirous of keeping the rateable value of the works in the Borough. The only other available site was the one where the new works now stood. This site was an expensive one, as a large amount of excavation had to be undertaken in order to make it level.

The scheme was accelerated for the purpose of providing work for the local unemployed, and in the carrying-out of this work 24,700 man weeks of local labour had been engaged, and 49,000 man weeks had been employed in the country generally. In the state of trade existing this had certainly been of benefit to the country as a whole, besides which the scheme, as a scheme, was self-supporting. He had every confidence that the savings effected by lower labour costs, improved working results, and reduction of transport costs would at any rate meet the interest and sinking fund charges. The price of gas would not be increased 1d. per 1000 c.ft. by this scheme—there would, indeed, be a tendency for the price to be reduced.

Among engineers there was always keen controversy in regard to the merits of verticals and horizontals, and they had had the same controversy in the Mossley Council. He went into the matter, and tenders were obtained for continuous verticals, intermittent verticals, and horizontals; and it was found that in a £100,000 scheme there was practically no difference between them in regard to prices. Taking labour costs, *plus* cost of coal *less* residuals, for the works, the annual charges were:

Horizontals	£4224
Continuous verticals	£4256
Intermittent ,,	£4311

He had had experience of two systems of continuous verticals, and he was convinced that they were not suitable for economically carbonizing the slacks that he used. He would not say that they would not carbonize a particular slack; but, in general, slacks were not suitable. This left the choice between intermittent verticals and horizontals, and the intermittent verticals were ruled out because of the dust and smoke nuisance at the top, and the difficulty of dealing with the hot coke in bulk at the discharge. He believed that the Mossley Corporation had now a good horizontal carbonizing plant and coke handling plant.

At the Institution Meeting, Mr. Gibson asked Mr. Clegg, following the reading of his paper, a question as to the advisability of accepting Government grants with the conditions attached. Personally, he would say that in a scheme of the character carried out at Mossley engineers would be well advised to add 15 p.ct. to estimates which they would make if having a free hand with regard to labour. All labour must be engaged through the local Labour Exchange. What happened was that, if 20 men were required, one sent for 40 men and chose the 20 men out of them. It would probably be found that 5 only out of the 20 chosen would prove themselves in any way suitable for the jobs; and after giving the remainder four or five days' trial they would have to be dispensed with, and there was no adequate return for the wages paid.

Councillor J. WILLIAMS (Manchester) also responded to the toast, stating that the Gas Industry could not afford to be conservative or to stand still. Many industries were to-day going to the Government and asking for assistance. The Gas Industry had not yet done so; they had not requested some measure of legislation which would assist them. The Gas Industry could assist itself, and make great progress, if only the shackles were taken from it. The present gas legislation was enacted nearly a century ago, and the Industry was now in a position of pleading for justice and for liberty. They did not ask to be subsidized. All that was wanted was a free opportunity to provide the public with a commodity it required for its daily use; and if this opportunity was afforded them, then the competition of electricity need not be feared.

The toast of "The Contractors" was then proposed by Alderman F. H. BELL, and responded to by Alderman G. CLARK, Lieut.-Col. K. C. APPLEYARD, J.P., and Mr. C. W. JAMES.

Institution of Gas Engineers

Mr. J. H. Clegg Replies to Mr. G. E. Currier and Mr. E. L. Nicholas

1. During almost the whole of the period under review the gas was diluted with flue gases taken from the outlet of the waste-heat boiler; at times some small quantity of blue water gas was used for this purpose. A typical analysis of the town gas is as follows:

CO_2 3·9 p.ct., O_2 0·5 p.ct., CO 6·9 p.ct., CnHm 4·3 p.ct., CH_4 23·0 p.ct., H_2 37·5 p.ct., and N_2 23·9 p.ct.

The thermal yield given does not, of course, include the water gas used, but it is purely a straight coal gas figure let down in the manner I have indicated.

2. A pan ash plant, although included in the original scheme, was not installed, as at the time the disposal of surplus coke was difficult. The carbon content in the pan ash varies considerably in relation to the care exercised by the firemen. A typical figure of the carbon content in the pan ash as removed is as follows: Carbon = 17·1 p.ct.

If there is a fairly large quantity of free coke in the pan ash, we have it picked out. I may say that we have a small pan ash plant installed at our old works, which—though highly efficient in separating our pan ash from the water gas plant—was found to be inefficient in separating pan ash from our retort setting producers. The specific gravity of the burnt coke too closely approached that of the clinker.

3. Over the period under review our electricity cost us 0·54d. per B.o.T. Unit. This can be taken as an outside figure, as our labour charges against the plant with more careful analysis could be cut down.

As I have omitted to reply to Mr. E. L. Nicholas, of Guildford, I will take this opportunity. Regarding the intervention of a cooler betwen the standpipes and the circulating tank, by cooling the circulating liquor with water certainly the work on the condensers can be reduced to a great extent. We have, of course, some cooling of the liquor by air, but I would rather cool the gas by water than cool hot liquor.

My mention of the apparent increase in cooling of the gas produced through Congdon pipes was to elicit further information on the subject, and Mr. Nicholas has stated quite definitely that his condensers are not so good as formerly, but this cannot be attributed to the Congdon system unless the temperature and quantity of the gas issued from the retort mouthpieces are the same as formerly and other conditions in the gas cooling system alike. It is only the accumulation of experience on many gas-works which will settle this point.

HIGH-LOW TEMPERATURE CARBONIZATION

The author of this article maintains that there is no real controversy between high and low temperature carbonization. Local conditions alone, he says, can decide which—or a combination of both—should be employed

By Howard T. Wright, M.Inst.P.T.

Much ink and energy have been wasted by the advocates of high and low temperature carbonization in an endeavour to prove the vast superiority of high over low, or *vice-versa*, in a laudable attempt to find the best methods of handling our only natural given wealth—coal.

As a matter of fact, there is no real controversy between high and low temperature carbonization; both systems have advantages and limitations. Local conditions alone can decide which, or a combination of both, should be employed. The deciding consideration in every case must always be, first, "Does it pay?" and, secondly, "Is it a sound technical proposition from the operation point of view?" This has all been said before, thousands of times; but it is well to repeat it.

It is thought that many of the failures of low-temperature plants have been due to the hostility behind this controversy. Some of those who have developed low-temperature plants have disdained to use the vast amount of knowledge that has been accumulated over many years of high-temperature experience, with a consequence that they start gravely handicapped by meeting troubles which the older industries have long since overcome and forgotten. Our old friend "trial and error" can be a wonderful help, but he dies of starvation when he has eaten up all the capital.

A little while ago the writer was retained to carry out some rather drastic modifications to a carbonization plant which was not giving satisfaction. These modifications were suggested by the writer, based on a fairly wide knowledge of the trouble experienced by a number of plants in England, Germany, and America, coupled with some experience of the commercial handicaps, due either to adverse markets, local conditions, or limitations intrinsic to the particular process. These commercial handicaps in turn also vary with the purpose for which the plant is erected—either as a self-supporting project, selling its own products; an adjunct to an industrial plant; or an adjunct, or even a primary generator, to a public gas-works.

The instructions were to carry out modifications, to one of a battery of retorts, in such a way that an official test could be made by the Fuel Research Board. Capital, and consequently time, were limited, so that it was not possible to make a prolonged run in order to find the best adjustments for the production of all the three commodities prior to the official test, but, with these handicaps, the official results are considered worthy of note, particularly in view of the fact that the whole of the mechanical troubles almost always found with this type of retort were eliminated, and the quantity and quality of the three products were distinctly good from the particular type of coal that was processed. But perhaps the largest advance indicated is to be found in the method of control employed, which gave a surprising flexibility, coupled with considerable accuracy and simplicity. The simplicity is illustrated by the fact that the labour employed upon all shifts was entirely unskilled. They, however, found no difficulty in maintaining constant conditions, in that any tendency of the temperatures to run away could be checked at once, without any appreciable time lag.

The retort modified was one of a battery of fourteen erected at Glenboig, near Glasgow, by the Bussey Coal Distillation Company, Ltd.

Retort.

The retort in question is of the internally heated producer type, where the heat for carbonization is provided by the combustion of a portion of the charge. There is a deep coal bed of flat, oval section, increasing in area from the top to the base. The coal bed rests upon a "grate" which, however, does not perform the usual duties of a fire grate, in that the air is not admitted through a grate but around the periphery of the retort some distance above.

The highest temperature zone is, of course, at the level of the air inlet. The products of combustion and gas pass up through the upper portion of the coal bed, which is preheated by the sensible heat of the gas, the gas itself leaving at the top of the retort at the rather surprisingly low temperature of 50° C.

The passage of the coal through the retort is practically continuous at the rate of 24 tons per day. The coal is in the retort for five hours from the time that it enters until it reaches the hottest zone. In the new form of retort a further five hours will be occupied by the coke in travelling from the hot zone to the point of discharge. For a portion of this distance the coke travels along water-cooled surfaces, so that it does not require direct water quenching.

Coke Discharge.

It is thought that much of the successful elimination of mechanical troubles is due to the method of coke extraction employed in the Bussey plant as operated under the modern conditions. The coke is extracted by means of a cutter-bar, which cuts a slice across the whole base area of the coal bed at each stroke, the strokes taking place in opposite directions alternately. The travel of the cutter-bar is on the arc of a circle, so that it has a vertical as well as a horizontal component, which results in an almost continuous movement of the whole coal bed.

The measurement of the resistance of the coal bed to the passage of gas shows that the action of the cutter-bar tends, to a large extent, to keep the resistance constant. This, it will be fully realized, is a very considerable help in maintaining constant conditions.

A notable feature was that no poking of the coal charge was necessary. No hold-up and no channelling were experienced. Some people find it difficult to believe this statement. It is, however, quite true; but it should be pointed out that this very desirable result was not entirely due to the action of the cutter-bar, but was greatly assisted thereby.

Method of Control.

As the section of the retort is a flat-sided oval, and air is admitted all around the periphery, the distance from the air inlet to any part of the area is only small, with a consequent elimination of a green core of uncoked coal, notwithstanding the large body of coal.

The throughput of coal is controlled by the speed at which the cutter-bar is allowed to operate. The air supply is maintained constant per ton of coal throughput. The quantity of air per ton is fixed by the relation of gas and coke that is desired.

The temperature of the hottest zone is controlled by the admission of steam with the air, and the quantity of steam that is converted into water-gas is, of course, regulated by the temperature of the hot zone.

In order to test the flexibility of this method of control, the therm output was purposely varied from 50-180 per ton of coal charged. It will, of course, be realized that at the higher figure practically complete gasification was taking place, and there was no saleable coke. At 50 therms the coke yield was 13¼ cwt. to the ton. It was noted that at the higher therm output, where, of course, the hot zone was higher than with the low therm output, the gas temperature leaving the retort was only 63° C., as against a normal figure of 50° C. The throughput was naturally smaller under the large therm output than at the normal gas yields.

For the purpose of the official test the therm output was purposely fixed at 76 per ton and the equivalent coke yield to 10 cwt. per ton. This was done because the local conditions are such that the gas from this plant is sold to adjoining brickyards, which are fitted with producer gas fired kilns. The local conditions, therefore, suggested that the gas be stressed at the expense of the coke.

Coal Used.

The coal used was supplied by Messrs. Wm. Baird & Co., Ltd., from the Bothwell Castle Colliery. It was sized and

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¶ The Burner, placed at the side, is easily accessible for lighting.

¶ The AJUSTO Regulator allows of complete automatic cooking control, giving perfect results with the minimum of attention and gas consumption.

¶ The Hotplates are designed to avoid flame interference and secure rapid heating. The patent taps have automatic adjustment to compensate for wear in use.

¶ The porcelain enamelled finish is permanently attractive and the surfaces are easily cleaned.

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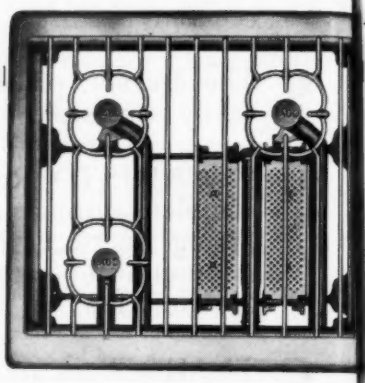

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To meet this demand, Radiation Limited has designed the ERA NEW WORLD with the single oven burner and direct-bottom-flue-outlet, first introduced in 1923 in the "New World" Gas Cooker.

Provision is made for the "Regulo" oven-heat control. Because the general utility of many ovens is seriously limited by their inadequate width, the ERA NEW WORLD is built on generous lines and will cook a dinner for a family of six.

Special attention is drawn to the height of the stand, which minimises stooping, and at the same time adds that "distinction" which cannot fail to impress all who examine the cooker.

The ERA NEW WORLD is also supplied in "Rado" porcelain enamel finish with "Regulo" oven-heat control. For the extra cost involved the added convenience and saving in labour attained with the enamelled cooker will prove a great attraction, particularly in the case of the better class Housing schemes.

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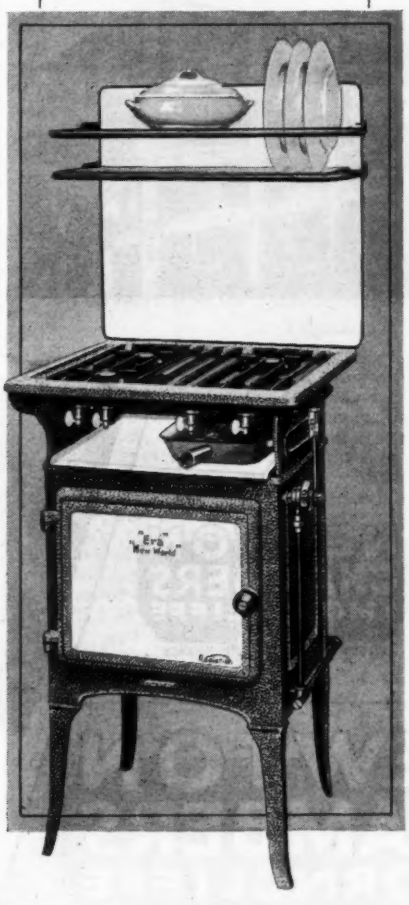

WORLD'

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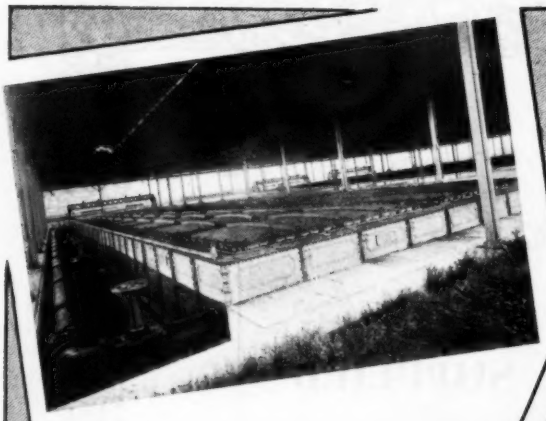

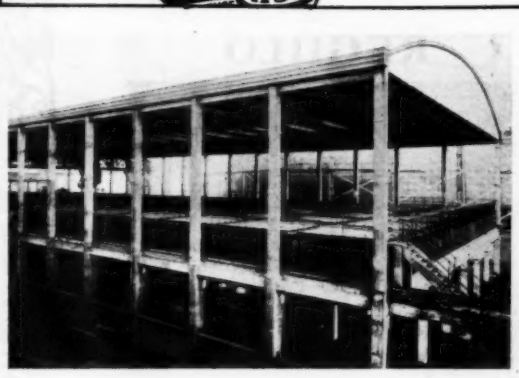

NEWTON CHAMBERS THORNCLIFFE
EXPERIENCE ESTD: 1793 EFFICIENCY

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ESTD: 1793
EXPERIENCE EFFICIENCY

NEWTON CHAMBERS THORNCLIFFE
ESTD: 1793
EXPERIENCE EFFICIENCY

washed, but owing to the method of handling the coal as it actually entered the retort gave the following screen test:

Screen Analysis.

	Coal from Top Hopper. P.Ct.
On a 2 in. screen	0·0
Through 2 in. on 1 in.	56·0
,, 1 in. on ½ in.	27·0
,, ½ in.	17·0

The proximate analysis of the coal was as follows:

	Air Dried.
Moisture	7·7
Volatile matter, *less* moisture	35·0
"Fixed carbon"	52·3
Ash	5·0
Caking index (Gray-Campredon)	10
Calorific value (air dried)	12,580 B.Th.U. per lb.

Yield.

The yields of products per ton of the above coal as charged, containing 11·1 p.ct. of moisture, were:

Coke, cwt.	10·20
Tar, galls.	17·61
Gas spirit, galls.	3·24
Gas, c.ft.	40,270
,, therms	76·0

The above bare statement of the yield is of very little value without some knowledge of the quality of the various products.

Gas.—As stated above, the therm value was purposely fixed at the rather high rate of 76 therms per ton at the expense of the coke. The actual C.V. of the gas as tested was 189 B.Th.U. per c.ft., but during the test there was an air leak at the exhauster of about 10 p.ct. of the volume of the gas, so that the actual C.V. was 210.

The analysis of the gas as taken during the tests is as follows, from which the existence of an air leak into the system is obvious:

Analysis.	P.Ct.
CO_2	6·2
C_nH_m	0·5
O_2	3·0
CO	15·3
H_2	21·4
C_nH_{2n+2}*	3·6
N_2	50·0
	100·0

* n = 1·33.

Calorific value, B.Th.U. per c.ft.	189
Specific gravity (air = 1)	0·810
Tar fog, gm. per 100 c.ft.	1·69
Ammonia, grains per 100 c.ft.	12·5

The gas is of a good producer quality, the flame temperature being in the nature of 1700° C., and it requires 1·75 of air to 1 of gas for its combustion.

It should be noted that during the test no tar extractor at all was used. The tar was simply collected from the condenser discharge.

Duration of Test.

A preliminary run of 30 consecutive days was made prior to the test, in order to try out various rates of output and throughput. Observations were taken for the official test during six of the remaining twelve days that the plant was running, so that it was in operation all told for 42 days.

Absence of Dust.

A remarkable feature was the success of the dust catcher, which was provided in the top of the retort. No dust or soot or other lodgment was found in the hydraulic main after the 42 days' run, notwithstanding the low temperature and the fact that no flushing arrangements were employed.

Temperature Regulation.

The retort was fitted with four thermo-couples—two near the top and two near the bottom, on opposite sides of the retort. The record charts from all these couples show practically a straight line, except where variations were purposely made in order to test the flexibility and speed with which the variation of temperature answered the adjustments. It was noted that it was possible to keep the temperature on the two sides of the retort the same by employing a separate air control for the two sides. Very little adjustment, however, was necessary, as the natural fluctuations were small. This is shown by the constant quality of the gas. From various analyses taken, the gas shows very little, if any, variation in its quality, notwithstanding variations in quantity.

Coke.

The coke constituted a good smokeless fuel that can be burned with reasonable efficiency in a vertical bar open grate. It was harder in texture than is usual, and stands handling well.

Proximate Analysis (as Discharged).

	P.Ct.
Moisture	1·2
Volatile matter, *less* moisture	12·8
"Fixed carbon"	72·9
Ash	13·1

Proximate Analysis of Coke from Screen (Air Dried).

	Lump Coke. P.Ct.
Moisture	2·3
Volatile matter, *less* moisture	6·3
"Fixed carbon"	81·3
Ash	10·1

The calorific value of the coke as discharged was 12,590 B.Th.U. per lb.

During the test the coke was quenched by water spray, as the water cooled surface was not then fitted, and the calorific value of the lump coke, as weighed, was 11,420 B.Th.U. per lb., as it contained 11·6 p.ct. of moisture.

The screen analysis of the coke as discharged from the retort was as follows:

	Average Samples from Base of Retort. P.Ct.
On a 2 in. screen	4·7
Through 2 in. on 1 in.	54·3
,, 1 in. on ½ in.	27·2
,, ½ in.	13·8

It was found that the optimum size for burning in an open grate was from ½ in. to 1 in.

It will be noticed that the percentage of ash of the lump coke, after screening, was 10·1 p.ct., while the percentage as discharged from the retort was 13·1, so that 3 p.ct. of the ash was eliminated by screening.

In cases where less gas is taken from the coal, the percentage of ash in the coke would, of course, be less, because there would be a larger yield of coke from the same ash content in the original coal. The temperature of the hottest zone in the retort is never above the melting-point of the ash, so that no clinker is formed. One would, however, always use coal with as little ash as possible, notwithstanding the fact that a certain percentage of the ash is removed by screening.

Tar and Oil.

The tar has been examined by Mr. Harold Moore, and from his full report it would appear that the best method of marketing this class of tar is to divide it into two fractions, and sell the first fraction as a light spirit and the residue as a fuel oil. The light spirit is of the paraffin series, and contains 52 p.ct. of aromatics, and refines into a stable product after the removal of the tar acids. The residue would, of course, be quite water free, and is a satisfactory fuel oil, suitable for consumption in a simple low-velocity flame burner without filtration. The advantage of marketing the tar by this method is that both fractions meet a market which is very large and does not tend to overcrowd the usual channels for disposing of tar.

Liquor.

In a producer of this type the quantity of liquor is necessarily higher than with some other types. The quantity produced during the test was 49·9 galls. per ton of coal as charged when the original coal had a moisture content of 11·1 p.ct., and the amount of steam added was 10 p.ct., showing that under the conditions of a therm output of 76 per ton there was a certain amount of water gas reaction. The specific gravity of the liquor is quite near to that of the tar, and if it is allowed to stand in contact with the tar for any time, separation becomes difficult because the gravity of the liquor increases. There is no indication of emulsification, and separation can be made to a reasonable degree of dryness by mechanical means, provided this is effected at once on the tar leaving the condenser and detarrer, and at a temperature of 40° C. The above method of dealing with the tar ensures a water-free fuel oil.

The liquor analysis taken after the tar and liquor had been in contact for six days was:

	From Initial Separation.
Specific gravity at 15° C.	1·012
Total ammonia, gm. per 100 c.c.	0·83
Tar acids, gm. per litre	10·3
Neutral oil, ,, ,,	1·5
Bases, ,, ,,	trace

After standing in contact with the tar for three weeks, the analysis was as follows:

Specific gravity at 15° C.	1·031
Total ammonia, gm. per 100 c.c.	2·10
Tar acids, gm. per litre	14·8
Neutral oil, ,, ,,	2·4
Bases, ,, ,,	trace

When separation of the tar and liquor is made at once, the liquor has very little colour, but when standing in

contact with the tar it becomes a dark red and has a much stronger odour.

The liquor at Glenboig was discharged into an open burn or drain. Complaints were received when the liquor was discharged after long contact with the tar, but no objection was raised to the quickly separated liquor.

High-Low Temperature.

It will be noticed that the Bussey is neither a high nor a low temperature process as usually understood, because the gas and coke are primarily made under fairly high temperature conditions in the region of 1000° C., while the oil is distilled under lower temperature conditions than is usual, the outlet temperature of the retort being only 50° C.

In this process there is also a certain water gas reaction, which tends to increase the heat value of the producer gas and also gives the plant very great flexibility and the possibility of alterations to meet a fairly wide variety of local conditions and class of coal processed.

Adjunct to a Gas-Works.

Based upon the yields given in the official test (which are not by any means the best possible) and the methods and cost of control, it would appear that, if a retort of this design were fixed as an adjunct to a gas-works, for making producer gas for heating vertical gas retorts, the cost of the producer gas would be 0·75d. per therm. If two retorts were used, the figure would be 0·5d. per therm. These figures are based on purchasing coal at 14s. per ton, paying all labour and other costs in operating the plant, and also including 16 p.ct. on the capital outlay to cover repairs, depreciation, and interest on capital, and also when selling the smokeless fuel at only the same price per ton as paid for the coal, and when selling the light oil at 10d. and fuel oil at 3d. per gallon.

In considering the price that can be obtained for the light spirit, it must be remembered that it contains a high percentage of aromatics, and would consequently be of too good a quality to sell as a motor fuel direct, but would be used as a blend for increasing the anti-knock quality of any petrol. It is thought that 10d. per gallon is a fair price, particularly in view of the recent increase of the tax on imported light oils. The fuel oil is taken at £3 per ton as against the cost of paraffin base fuel oil at £3 10s. per ton.

FINE NEW SHOWROOMS AT HACKNEY

One of the largest of the Gas Light and Coke Company's District Showrooms, Offices, and Stores were opened in Mare Street, Hackney, on June 24 by the Mayor of the Borough

The original showrooms and offices of the Company in the Hackney area were opened in 1898. Since that date the district served by them has been steadily growing and developing until the Directors decided that new and up-to-date premises were essential if the increasing volume of business was to be satisfactorily handled. The last 33 years have seen the number of consumers in the area increase from about 26,000 to 91,000, and it is interesting to note that over 52,000 callers visited the existing showrooms during 1930.

In the past Hackney was a residential neighbourhood, and for many years gas was used almost entirely for domestic purposes. To-day, however, with the growth of industry which has taken place there, as in almost every part of London, the features of the district have undergone a change. The principal interests in the area now are cabinet-making and boot and shoe making, for both of which gas is of great importance. In addition, there are firms of food distributors and manufacturing chemists, with very large annual gas consumptions.

The new showrooms and offices at 277, Mare Street, are the work of Mr. Walter Tapper, A.R.A., F.R.I.B.A.

The showrooms on the ground floor are laid out on the Company's usual attractive lines, with the apparatus sectionalized and displayed under the best possible conditions and, in the case of fires, in suitable and harmonious surrounds. The windows are of the "open" type, generally approved by the Company, while there are two small sections of window space closed for special feature displays. A very wide variety of domestic gas apparatus is to be seen, much of it being connected up for demonstration purposes. A bathroom section is particularly interesting, being complete with hot water apparatus and clothes-airing cupboard with glass-panelled door. A counter is provided for the payment of accounts, while a special opening is provided at the back for prepayment meter collectors to pay in without having to come into the main showroom. The lighting is all switch-controlled and is very effective.

The first floor is occupied by the offices of the district staff, and above them on the second floor a large room has been built for the cookery lectures and demonstrations of various kinds which have proved such a popular feature in the past.

The main premises are backed by a yard, along one side of which is another three-storeyed building, designed by Mr. H. Austen Hall, F.R.I.B.A. This contains the foremen's offices and stores for the apparatus and materials essential to the work of the outdoor staff. On the top floor a fine clubroom has been provided for recreation purposes, which will serve also as the staff dining-room. A staff of some 300 fitters is attached to this depôt.

The Building Contractors employed were Messrs. Chinchen & Co., of Harlesden.

The opening ceremony was performed by Councillor C. F. Williamson, J.P., Mayor of Hackney, who was accompanied by Mrs. Williamson (the Mayoress), and supported by the Mayor of Stoke Newington, members and principal officers of the Hackney Borough Council, the London County Council, the Chamber of Commerce, and the local Rotary Club.

The visitors were welcomed by the Governor of the Company, Sir David Milne-Watson, LL.D., D.L., with whom was Mr. R. W. Foot, the General Manager of the Company. There were also present the Secretary (Mr. W. L. Galbraith), the Accountant (Mr. H. E. Ibbs), the Deputy Controller (Mr. Stephen Lacey), Mr. H. Strang (the Inspector-in-Charge of the new offices and showrooms), together with the other Senior Officers of the Gas Sales Department.

The Opening Ceremony.

Tea was served in the Recreation Room, where music was also provided by Mr. Newman's Orchestra, after which

Sir David Milne-Watson, before calling upon the Mayor of Hackney formally to declare the premises open to the public, took the opportunity of welcoming on behalf of the Directors of the Gas Light and Coke Company those present. As they were aware, said Sir David Milne-Watson, they had had showrooms in Hackney for many years—since 1898—but they had gradually grown out of their premises, and as it was a question of re-building they determined to acquire a new site and re-build the whole premises—showrooms, offices, and stores. Therefore the Company had erected this very fine building, and one of which Hackney would not be ashamed. The Gas Light and Coke Company, continued Sir David, was a very old Company, having been formed in 1812—120 years ago—and he was glad to say that notwithstanding their great age they were still youthful in spirit and progressive in thought and were increasing their business year by year. Those showrooms were primarily to show gas to the public and to indicate the very latest gas-using appliances. He thought they would agree that not only would the public see things of the utmost utility, but they would also see things that were in themselves artistically beautiful. The activities of the Company were extremely numerous, went on Sir David; they not only catered for the public, but they also tried to live on the best terms with their employees. He referred to the co-partnership scheme of the Company, mentioning the fact that co-partners held over £850,000 of the Company's stock, and stated that they had a hundred acres of sports grounds in various parts of London. In conclusion, he remarked that they were glad to have with them on that occasion Mr. Walter Tapper, A.R.A., and Mr. Austen Hall, the architects responsible for the work in these buildings, and he was sure all would agree that they had done their work most excellently.

The Mayor of Hackney, in the course of a few remarks preparatory to declaring the premises open, said that he appreciated sincerely the opportunity that had been given to him as civic head of the Borough to perform the opening ceremony

of this magnificent addition to the Borough. He was particularly struck with the very fine layout of the premises generally, which reflected credit to the greatest degree on the two architects who had been so closely associated with this extension. The fact that the number of consumers in the district had increased from 26,000 to 91,000 since the old showrooms were opened indicated conclusively that the Company was a live undertaking. Furthermore, they were living in a period of industrial depression, and it was gratifying to find a Company such as this which could "snap its fingers" at this depression. He went on to refer to the importance of the Gas Industry in the effective utilization of the country's greatest national asset—coal—and to the innumerable bye-products which the Gas Industry made available. Councillor Williamson also congratulated the Gas Light and Coke Company on their staff welfare work, which, he said, was admirable, and he hoped that all the other great industries throughout the country would follow their excellent example. In conclusion, he remarked that his duty was a simple one. "May these showrooms and offices," he said, "fully justify all the attention and thought that has been devoted to them, and may your future progress be justified by your attitude in putting up such a building as this." With these words he formally declared the premises open.

The Mayor of Stoke Newington, in supporting the Mayor of Hackney, thanked the Gas Light and Coke Company on behalf of those present for the hospitality extended. He also spoke of the value of co-partnership, and referred to the "service" of the Company, which, he said, was very fine. They not only supplied gas, but also looked after their consumers well afterwards. Sir Francis Goodenough, he remarked, was a great authority on salesmanship, and that was one of the points in which the Gas Light and Coke Company excelled.

EIGHTY YEARS OF GOOD WORK

Eastbourne Gas Company's Enterprise

Situated among flourishing and ornamental business premises, in the main shopping thoroughfare of the town, the showrooms and offices of the Eastbourne Gas Company occupy an ideal position for the important work which they have for so long a period undertaken, to the satisfaction alike of the public and the shareholders. With an enterprising Board and officials, therefore, it is but natural that these offices and showrooms should grow; and this is what has happened. Extension and improvement has taken place on a scale which received the unstinted praise of the large company which assembled to witness the formal opening of the extended premises on Thursday of last week.

Thus has another stage been reached in the prosperous career of the Eastbourne Gas Company, which is now in its eightieth year, having been formed in 1851, with a capital of £3000. In the year following that, the original works were erected near the Railway Station; but in 1868 the Company obtained statutory powers, and removed their works to the present site on Pevensey Flats. From its small beginning, the capital had, by 1900, been increased to £167,000, while the sale of gas had grown to over 325 million c.ft. Nine years later the Hailsham Gas Company was absorbed, and by 1920 the sale of gas by the combined undertaking had reached 537 million c.ft., a figure which had grown by last year to 628 millions. The capital now employed amounts to over £435,000, and the number of consumers at Dec. 31 last exceeded 16,000, of whom over 9000 had prepayment meters.

Opening Ceremony.

The opening ceremony was performed by the Mayor of Eastbourne (Lt.-Col. R. Gwynne, D.S.O., D.L., J.P.). He was received by the Chairman of the Company, Mr. Frank H. Jones, M.Inst.C.E., who was supported by Mr. B. Bradford, Deputy-Chairman, Alderman G. B. Soddy, Mr. C. J. Vinall, Mr. F. Eliot Williams, O.B.E., and Mr. Howell J. J. Price, J.P., D.L. (Directors), Mr. S. E. Knowles (Secretary), Mr. W. T. Charlwood (District Manager), and Mr. W. H. Hammond (Works Manager).

Mr. Frank Jones remarked that it was a very proud day for the Eastbourne Gas Company. In the first place, because the Mayor had come along to inaugurate their new venture, and secondly because it was another step in the progress of the Company. During the eighty years of their existence, he calculated that the Company had used about two million tons of coal; and if this coal had not been carbonized at their works, it would presumably have been used as raw fuel throughout the town, in which case the whole of the smoke and dirt would have passed into the air. Instead of this, the townspeople had enjoyed the use of gas and coke, both of which were smokeless fuels. The Company probably paid more in rates than any other individual undertaking, while as continuous employers of labour he thought that they occupied the premier position in Eastbourne. They practised co-partnership, and had a pension fund in addition, and in every way they tried to make the conditions of work congenial and happy.

He proposed a hearty vote of thanks to the Mayor, and this was cordially supported by the Deputy-Chairman, Mr. Bradford, who declared (with the evident approval of those present) that the welfare of the community was studied in every way possible by the Company.

The Mayor, in declaring the premises open, said that the community of Eastbourne were under a great debt of gratitude to the Company for the many benefits they had conferred upon the town. It was obvious that during the last eighty years the Company had accomplished much important work; and it was satisfactory to be able to feel that in every way the Directors and officers were keeping fully abreast of the times. It was only necessary to look at those beautiful showrooms to appreciate the progressive spirit which animated those who were connected with the Company. All who had the interests of Eastbourne at heart must be delighted at this addition to its amenities. The new premises were, indeed, a great asset to the town.

A Tour of the Showrooms.

The new building consists of five floors, including the basement, which is used for the purpose of store-rooms. On the ground floor are the showrooms and offices; on the first floor are other offices, including the District Manager's; on the second floor, the Board-room and offices, including that of the Secretary; and the third floor includes caretaker's quarters and a staff tea-room.

The showrooms are panelled to a height of 8 ft. with oak panels, and the fullest use of the opportunities for display in the matter of gas fittings and appliances has been made. A wide variety of the latest styles of gas fires is on view, complete with settings and mantelpieces, and with the gas supply piping and tap completely hidden from view. There are, too, gas cookers to suit both big and small households—and each piece of apparatus is arranged so as to make its own individual appeal. Nowhere is there even a hint of overcrowding.

A feature of the showrooms is a demonstration room, in which are fitted different types of water heaters, for domestic and other purposes. In one of these—the "Eastbourne"—the Company have a particular interest. This is a boiler admirably designed for use in the home, in restaurants, hotels, and wherever a constant supply of boiling—as distinct from hot—water is required. The cylinder is of white enamel, and in place of the polished copper and brass which regularly requires cleaning, oxydized copper fittings have been provided. After being made up by the Eastbourne Gas Company, it was sent to the manufacturers, who decided to continue its production. Five of these boilers are to be fitted in the Princess Alice Hospital. A demonstration showed that in little more than four minutes boiling water was available from cold. The "Eastbourne" will supply 280-300 pints of boiling water per hour; and it is foolproof, in the sense that only boiling water can be drawn. Should the boiling water not be drawn off, a special valve automatically shuts down the gas supply.

Switch controlled lamps which ventilate as well as illuminate are in use in the showrooms and in the Board-room, and there are beautiful examples of candle lamps and hall lanterns.

The Architect responsible for these extended premises is Mr. R. E. Bailey, of West Terrace, Eastbourne.

Stoke-on-Trent Launches Hot Water Campaign

A Series of Displays and Cookery Lectures which Secured an Immediate Increase in Business

HOT WATER SPRINGS ETERNAL WITH GAS
GENERAL IMMERSION INDIRECT
HOT WATER APPLIANCES
EASY QUARTERLY PAYMENTS
AT INCLUSIVE RATES
FREE ON PAYMENT OF FIRST INSTALMENT.

In order to popularize gas for water heating, the Stoke-on-Trent Gas Department have prepared a scheme of hire purchase at inclusive rates, for a selected number of appliances. The appliances chosen include "Sunhot" boilers (4 sizes), "Equator" boilers (2 sizes), "Newlyn" boiler and immersion heater. The period of payment is either three years or five years at the customer's option. The quarterly rates include all fixing costs, so that the customer has nothing further to pay beyond the quarterly instalments.

Having prepared the scheme, the Gas Department looked around for the best means of introducing it to residents of the City, and it was decided to organize a series of cookery lectures and to demonstrate the appliances to visitors. The services of Miss Lina Parkyn, the cookery lecturer, were obtained, and four halls in different parts of the City were rented for a period of one week at each hall. The hot water appliances were fitted to two panels which were mounted one at each side of the lecturer's platform, a bath and sink were fixed, and all connected up. The sink was used during the lectures, thus giving a practical demonstration of a hot water service. After the lectures the salesmen talked to interested visitors and explained points with the aid of the working apparatus.

The lectures and displays were extensively advertised in the local Press; posters were brought into service; and ten thousand invitation tickets were distributed by the showrooms, meter inspectors, and fitters. Afternoon tea was provided free, and music was also provided. The lectures proved popular, and the immediate business secured was very gratifying.

The Lord Mayor (Councillor H. J. Colclough), speaking at the opening ceremony, wished all success to the scheme. The Lady Mayoress, in a very happy speech, declared herself wholeheartedly in favour of gas in the home. The subject appeared to give her much pleasure, and it was plain to see she was speaking from the vantage point of first-hand knowledge. She declared gas cooking to be truly economical in the widest sense—economical from the point of view of cost, labour, and as a time saver.

The lectures and displays were brought to a successful conclusion by the presentation to Miss Parkyn of a Wedgwood vase by Mr. A. MacKay, Engineer and General Manager, as a memento of her visit to the Potteries, which had, in the words of Mr. MacKay, been so happy and successful.

Parliamentary Intelligence

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Commons amendments to the Gas Light and Coke Company's Bill have been considered and agreed to. The Bill is now awaiting Royal Assent.

The Sheffield Gas Bill has been brought from the Commons, read a first time, and referred to the Examiners.

The Ministry of Health Provisional Orders Bill, dealing with the Stretford and District Gas Board, has been read a second time, and referred to the Committee on Unopposed Bills.

Special Orders.

The North Middlesex Gas Order has been laid before the House, and referred to the Special Orders Committee.

The following Special Orders, having been passed by the Special Orders Committee, have been approved by the House: Brighton, Hove, and Worthing; Pontardulais; and Portsmouth.

House of Commons.

Private Bills.

The Sheffield Gas Bill, as amended in Committee, has been considered on report, read a third time, passed, and sent to the House of Lords.

The Royston and Brodsworth Gas Bill has been considered on report, read a third time with amendments, passed, and sent to the House of Lords.

Special Orders.

Plans have been deposited in connection with the following Special Orders: Rhyl; Skegness; and Wantage.

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDERS.

Gosport and District Gas Company.

This is an Order to extend the limits of supply of the Gosport Company, and to provide for the transfer to the Company of the undertaking of the Bishop's Waltham Gas and Coke Company, Ltd. The Company also desire other powers in connection with their undertaking.

Kidderminster Gas Company.

To confer new powers upon the Company with respect to the creation and issue of debenture stock, to make new provisions as to dividend on preference capital, to empower the Directors to reserve a proportion of future issues of capital for exclusive offer to consumers and employees, to define or fix basic prices of gas and rates of dividend, to authorize the Company to adapt lands for the purpose of sports or recreation grounds, &c.

Rhyl Urban District Council.

To extend the limits within which the Council are authorized to supply gas, to make provisions with regard to charges, to authorize the Council to purchase additional lands and to borrow money, and to confer upon them various general powers for the better regulation of the gas undertaking.

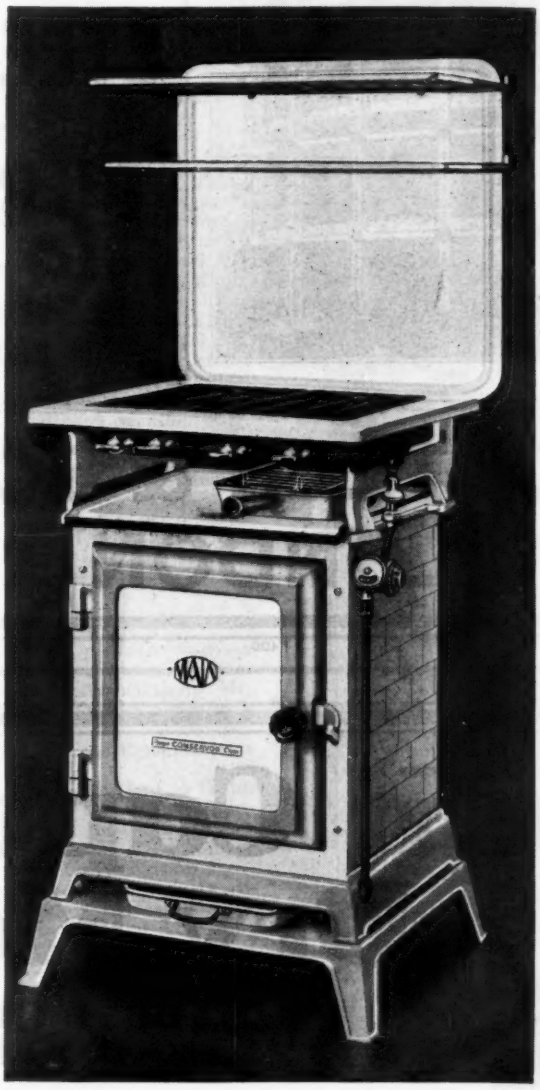
Skegness Urban District Council.

To authorize the Council to purchase scheduled land, to empower them to borrow money, and to confer upon them general and incidental powers in connection with the gas undertaking.

DECLARATION OF CALORIFIC VALUE.

Bollington Urban District Council.—480 B.Th.U. (Oct. 1.)

Deluxe Mainamel



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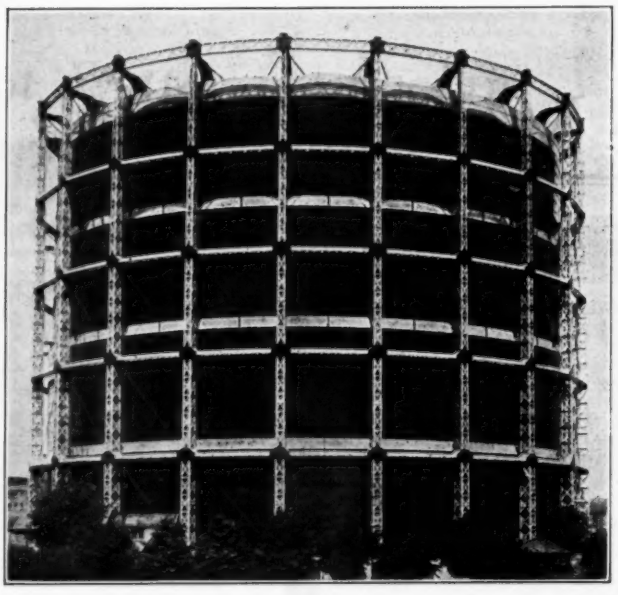

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THE "JOURNAL" TECHNICAL RECORD

Which contains Full Reports of Meetings of Gas and Allied Associations

Waverley Association of Gas Managers

PRESIDENTIAL ADDRESS BY MR. J. D. SMITH, BELFAST

The Annual General Meeting of the Waverley Association of Gas Managers was held in the Goold Hall, Edinburgh, on June 26. Mr. J. D. SMITH, Engineer, Manager, and Secretary of the Belfast Corporation Gas Department, was in the chair, and was accompanied to the platform by Mr. David Vass, of Perth (last year's President), and Mr. R. J. Philp, of North Berwick, the Hon. Secretary of the Association.

The President referred in sympathetic terms to the loss the Association had sustained since the last annual meeting by the death of five members. He particularly commented on the fact that the late Mr. Thomas O'Neill, of Dunbar, had been President of the Association in 1908. The others who had died, he added, were: *Ordinary Member*—Mr. Harry Gourlay, Markinch; *Extraordinary Members*—Messrs. P. B. Watson, Glasgow; A. Pollard, of Messrs. George Bray & Co., Ltd., Leeds; and C. B. Tully, of Messrs. Tully, Sons, & Co., Ltd., Newark-on-Trent.

The HON. SECRETARY, at this stage, read a communication from the Secretary of the Gas Institute of New Zealand, conveying greetings "from the youngest Gas Institute in the British Empire to the oldest."

NEW OFFICIALS.

The PRESIDENT said it gave him great pleasure to move that Mr. James Bell, of Dumbarton, should be elected his successor as President of the Waverley Association. Mr. Bell was certain to prove a most valuable and acceptable President.

The motion for the election of Mr. Bell as President was seconded by Mr. A. DOW, of Galashiels.

Mr. JAMES BELL, in acknowledging, said he had to thank the members of the Association for their unanimous choice of him as President for the ensuing year. He could assure them that he would do his best to uphold the traditions of an Association which was the oldest in Great Britain.

Mr. R. J. Philp, North Berwick, was unanimously re-elected Hon. Secretary and Treasurer, while Messrs. James Jamieson, of Edinburgh, and George Taylor, of Aberlady, were unanimously elected to fill two vacancies on the Committee. The reappointment of Mr. John O'Halloran as Auditor was carried with acclamation.

PRESIDENTIAL ADDRESS

of Mr. J. D. SMITH, of Belfast.

I would like, in the first place, to express my appreciation of the honour you have conferred upon me in electing me vour President upon this, the seventieth anniversary of the formation of the Waverley Association of Gas Managers. My connection with the Waverley Association dates as far back as 1893, in which year I was appointed its Secretary; and although for many years my professional duties have lain far outside its sphere, my interest in its proceedings and in the doings of its members has not in any way diminished.

The Association holds a unique place among the technical organizations of the Gas Industry, inasmuch as it was the first association of gas engineers to be formed in this country. Even in those early days, our predecessors were faced with the problems arising from the rapid growth of the Industry; and when, in 1861, they banded themselves into an association to provide a common field for the exchange of ideas and for the discussion of their problems, they displayed a foresight which has been amply justified by the number of similar bodies which have since become such an essential part of the organization of the Industry. No doubt one of the objects which those responsible for its formation had in mind was to bring more prominently before the public the services which they had to offer; and to-day we find the consummation of this idea in our British Commercial Gas Association, which, on behalf of the Industry as a whole, carries out its work of propaganda and of education of the consumer in a manner which compels the admiration and even excites the envy of our competitors.

PIONEER WORK.

The problems which confronted these early engineers may seem elementary in the light of our accumulated

JAMES D. SMITH, M.Inst.C.E., M.Inst.Gas E.

Mr. Smith served an apprenticeship as a Mechanical Engineer in Hawick and thereafter became Assistant to his father, who was Engineer and Manager to the Hawick Gas Company. In 1893, he was appointed Manager of the Selkirk Gas Company; and in 1897 Engineer and Manager to the Stirling Gas Company. In 1910 he was appointed Engineer and Manager of the Belfast Corporation Gas-Works. While in Stirling Mr. Smith was President of the North British Association of Gas Managers; in 1923 he was President of the Institution of Gas Engineers; and in 1925 he was President of the Irish Association of Gas Managers.

knowledge and in comparison with the magnitude of the questions and the multitude of technical reports which come up for discussion at our meetings to-day, but no doubt the proceedings were of no less interest on that account. We must remember that the Industry was then in its infancy and that its engineers had to work from first principles, without the facilities for the acquisition of technical knowledge which exist to-day, and that progress depended entirely upon personal initiative, and not upon researches and investigations conducted by a central body. It is upon the foundation laid by the experience and knowledge acquired from the successes, and no less from the

failures, of these pioneers that the whole structure of our Industry has been built up; and I think you will all agree with me that, with the limited resources at their command, those early engineers did their work remarkably well.

Central Organizations.

To-day the Industry is splendidly served by the various organizations which have been brought into existence by the widening scope of its activities and the magnitude of the scale of its operations. The various technical problems as they arise are investigated by special Research Committees of the Institution. Advertising and propaganda work are in the hands of the British Commercial Gas Association, while the National Gas Council looks after its legal rights and activities. Each of these organizations performs its various functions in a manner which leaves little to be desired—so well, in fact, that it seems to me that there is a grave danger of the various units of the industry losing their individuality, so far as the quest for progress is concerned, and becoming too dependent upon the central bodies for ideas and for the general advancement of the Industry. There can be no question about the utility of these organizations or of the necessity for their existence. They are essential for the correlation of certain of our activities and for the handling of questions which affect the Industry as a whole; but they cannot provide a substitute for the individual effort which has built up the position we now hold, and there is a greater need than ever for the old pioneer spirit which was displayed in such marked degree by our forefathers, if we are to continue to hold our proper place and make progress under the present-day conditions of intensified competition.

It is natural on an anniversary such as this that we should cast our minds back over the intervening years, and, in noting the advances that have already been made, take stock of our present position and endeavour to find some lead for our future policy.

Increased Efficiency.

Even within the lifetime of most of us, we have made great strides in the use of coal as we get it, both from the point of view of increased yields of gas, tar, and ammonia, and reduction in the amount of potential energy required to complete the carbonizing process. In 1898-99, the first year in which the Board of Trade Returns include water gas, we supplied 47,287 million c.ft. of gas to the public, and we carbonized 4,883,148 tons of coal—that is to say, we sold a little less than 10,000 c.ft. of gas per ton of coal carbonized. In 1929, the last year for which the Returns are available, we sold 292,598 million c.ft. of gas, and we carbonized 17,887,000 tons of coal—that is to say, we sold nearly 16,500 c.ft. of gas per ton of coal carbonized.

In other words, we have increased the efficiency of our process, as measured by the sale of gas per ton of coal utilized, by 65 p.ct. in the last thirty years.

Carbonization.

Of the 316,420 million c.ft. of gas made during the period covered by the 1929 Returns, 254,800 millions, or 80 p.ct., was made in some form of carbonizing plant, and 46,350 millions, or 15 p.ct., was made in independent water gas plants. The advent of the continuous vertical retort, in which the two processes are to some extent combined, has been one of the most noteworthy developments in recent years; and although it has not by any means entirely superseded the horizontal retort, it has established itself so firmly in the front rank of carbonizing apparatus that there is every indication that the proportion of gas made by this means will continue to expand at a rapid rate. In spite of the favour in which verticals are generally held, a few large horizontal installations have been put into operation within the last few years, and the results which have been obtained from them show that a modern installation is capable of an efficiency which was considered impossible a few years ago; and there is little doubt that in certain circumstances, they are still capable of yielding results which, from an economic standpoint, are very satisfactory.

The same cannot be said for the inclined retort, which has now practically disappeared, and the coke oven has so far proved unsuitable except for its own particular purpose or for certain exceptional cases in very large works. Considerable experimenting has been done with several forms of complete gasification plant, but so far no great bulk of gas has been made in them, nor does it appear likely that the trend of gas manufacture is in that direction. Many processes of what is known as low-temperature carbonization have been offered to the gas engineer, and some have been given a trial in practice, but none offers any inducement for adoption on a large scale. Whatever lingering prejudices there are against the gas fire are being very rapidly broken down, so that there appears to be no reason why any effort should be put forward to save the open, solid-fuel fire from complete extinction, for, even if there is an absence of smoke, there still remain the dirt and ashes attendant on its use.

In all types of gas-making plant great advances have been made in recent years. In all types of retort settings still higher temperatures are in use, rendered possible by improved refractory materials. The design of the settings has been overhauled and the heating of retorts greatly improved, while the effective insulation of retort benches has been studied and new materials introduced for this purpose. Such points of detail as improved methods of taking away gas and tar have added to the efficiency of installations from this point of view.

The Continuous Vertical Retort.

The greatest advance, however, in gas production is that of the continuous vertical retort. The continuous system of carbonization in vertical retorts has placed in the hands of the gas engineer an instrument which solves many of his problems. Its freedom from the nuisance incidental to intermittent charging and discharging and coke quenching is well known, enabling it to be used in works within residential areas; and its adaptability to all varieties of coal and other economical exploitation has been frequently commented upon.

But the most important advantage of this type of plant in my experience, apart, of course, from the greatly improved results obtained, is the very restricted ground area upon which it can be installed. In 1910 we at Belfast were confronted with a very difficult situation, and it was only the adoption of the continuous vertical retort system which enabled us to carry out the extensions of carbonizing plant, which had then become imperative, on the existing site, and to save the very considerable expense which would have been involved in the removal of the works to another position. In 1911 we put down Glover-West vertical retorts of a daily capacity of 2½ million c.ft., and this was followed in the next year by another installation of 5½ millions daily capacity.

These installations occupied the site of horizontal retort benches of something less than half their capacity. But the rapid improvement in the design of the Glover-West retort since then has further enabled us practically to double the capacity of the carbonizing plant again on the same site. The daily capacity of the now completely reconstructed installation is 15 million c.ft., and the whole installation stands upon an area of 19,570 sq. ft., giving a gas making capacity of over 766 c.ft. per sq. ft. of ground area, a figure which I believe compares more than favourably with that which could be obtained in any other way.

Waste Heat Recovery.

Another of the more striking advances has been that in the recovery of surplus heat from all types of retort benches. Not only is this form of economy important for its own sake, but it renders possible a freer use of a higher heat gradient within the setting, a point which is of particular importance in the vertical retort systems where speed and efficiency of carbonization depend upon a maximum speed of heat transference from the fuel gases to the charge within the retort, which is obviously a function of the difference in temperature between the two. There is no disadvantage in the products of combustion leaving the settings at a high temperature if the residual heat can be usefully employed for very efficient steam raising after it has done its work in the retort settings. There are several modern installations in operation now in which steam is raised from the residual heat of the products of combustion coming from the retort bench in such quantity that it is passed to steam-driven electric generators in which power is raised at so low a cost that no outside source of supply is able to compete with it, and, in addition, sufficient steam is available to meet practically all works purposes. Indeed, so efficient are some of the modern waste-heat recovery plants that practically as much steam is raised for every pound of fuel consumed in the producers as if that fuel had been consumed under the ordinary boiler.

This is not to be taken as any reflection on the boiler maker, because, of course, advances have been made in boiler design and construction at the same time, notably in the direction of water tube boilers fitted with mechanical grates especially designed to permit of the use of very low grades of fuel.

The Back-Pressure Principle.

There are some interesting variants on the foregoing method of applying the steam raised in waste-heat recovery plants. In some instances the fans providing the induced draught for the boilers have been arranged on the back-pressure principle, the steam leaving the fan at a pressure and temperature sufficient to carry it to the retorts for the "steaming" process. In other cases this principle has been applied to the steam engines driving the electric generators, steam being supplied to the engines at pres-

sures from 100 to 150 lbs. per sq. in. and superheated some 100° Fahr., and being exhausted at 30 to 50 lbs. pressure, still retaining 20° to 50° Fahr. of superheat.

All these developments have introduced into the gas-works modern steam-raising and power plant which was undreamt of seventy years ago, and they demand a degree of engineering ability in designers and operators which used to be somewhat unusual in the ranks of gas engineers. It is gratifying to feel that the demand is being creditably met by the personnel of the Industry, and we may rest assured that as improved machinery and processes become available they will be exploited to the fullest extent in our endeavour to provide greater service to our consumers.

We see, then, that progress of a revolutionary character has been made in our carbonizing methods, and it appears that with our modern carbonizing systems the actual cost of producing gas on the works as far as the holder has been reduced to almost the lowest possible extent. The other possible directions in which we can look in our efforts to produce a cheaper gas are (1) the cost of our raw material, coal; and (2) the returns from our residuals.

Coal.

The position of the coal industry cannot be regarded as satisfactory from our point of view. It still remains doubtful whether, under the quota system and the new marketing systems generally, the Gas Industry will not have to pay more for coal, and we still have no great hopes that the relations between owners and miners are such as to ensure a continuity of supply. We cannot, therefore, look for relief from this quarter, except such as can be obtained by ensuring that coal will be supplied to us as reasonably free as possible from inert matter. Effective means have still to be devised to this end, and at the moment only the very largest undertakings are in a position to see that they get value for money from the pits.

Sulphate of Ammonia.

Sulphate of ammonia has practically ceased to rank as an asset, and at the moment nothing very hopeful can be said about it. It is true that the farmer requires much more sulphate than he is at present using, but his own industry is in such a parlous condition that we cannot expect any great increase in demand from this quarter in the near future. The enormous plants which have been put into operation in recent years for the manufacture of synthetic ammonia have intensified competition to such an extent that the cost at which we can produce salt, using sulphuric acid, is too high to leave any profit for us. The manufacture of liquid ammonia forms a very useful adjunct to sulphate production where a suitable outlet can be found; but the market for this commodity is strictly limited, and we cannot look to it to absorb more than a very small proportion of our output. We await the advent of some inventive genius to show us some other way of combining our ammonia with the sulphur we produce ourselves, without the intervention of the acid manufacturer.

Tar.

The position as regards tar and tar products cannot be considered as being satisfactory, although it is encouraging to note that successful efforts are being made in many quarters to get back some of the market for road tar which has been too long left in the hands of the importer of bitumen. Our own experience in Belfast is that the demand for tar for road purposes is greater than it ever has been, but the price which it commands, as compared with prices ruling a few years ago, can only be regarded as inadequate. The British Road Tar Association is doing good work by propaganda and by advancing the virtues of the home-produced article in the proper quarters, and we look for an increasing demand as a result of its efforts. Certain it is that, given proper apparatus, the Gas Industry can supply all the tar that is required for the roads of our own country without assistance from foreign supplies of bitumen; and it is our duty, individually and collectively, to impress this at every suitable occasion upon those officials at our local authorities who are responsible for the roads.

Coke.

It is evident from the foregoing that we can look for little improvement in the returns from either our sulphate or our tar, so that it is to our coke that we must turn in our efforts to reduce the price of our gas. The outlet for coke differs from that for sulphate and tar in that it is practically a local one, and success depends to a greater extent upon individual effort. The coke market is a peculiarly advantageous one to the Gas Industry if only because the peak of its demand coincides to a considerable extent with the peak of the demand for gas throughout the year, and it is a market which can be satisfied with a minimum of transport and selling charges.

It is well worth while to devote considerable attention to the instruction of the consumer in the use of coke in the household, and to convince him that in coke he has a fuel which is economical and clean. This fuel has been discredited to some extent in the past, particularly with the domestic consumer, who objects very strongly to the " spitting " of the coke in the open fire, through being sent out in a waterlogged condition; so our first effort should be to supply it as free from moisture as possible. In this respect the coke produced in continuous vertical retorts is at a great advantage, as it does not require to be quenched with water (as does " horizontal " coke), and its value is therefore increased from a selling point of view, in most markets at any rate. Successful attempts have been made to overcome this difficulty with horizontal coke by installing some form of dry quenching apparatus, but in the continuous vertical retort this end is achieved in the ordinary course of operation, the residual heat being returned direct to the system, without the addition of any further apparatus. In our own case we are able to sell the coke from our vertical retorts with approximately 1 p.ct. of moisture, and complaints as to quality are practically unknown.

Grading and Cleanliness.

It is not, however, sufficient to provide a coke free from unnecessary water. It must also be graded into sizes to suit the various purposes for which it is required, and, above all, it must be clean—that is, it must be as free as possible from dirt in the form of ash, and it must be free from dust. Freedom from ash depends, of course, upon the coal from which it is produced, and here it may be remarked that the physical characteristics of the ash, as well as its proportion to the weight of fuel, should be investigated, though it is to be feared that the day has not yet arrived when we can afford to purchase coal with this point mainly, or even prominently, in view.

But there is probably nothing to which the purchaser of coke so strongly objects as the presence of loose dust in the bulk. Water spraying and quenching merely have the effect of causing the dust to lie on the pieces of coke as they leave the hoppers, only to be liberated when the bags are emptied in the purchaser's cellar, or at a later stage when the water has evaporated. The only safe cure for this objectionable feature is to remove the dust before the coke is placed on the vehicles for delivery; and here again vertical coke, being in a dry state during the screening process, has the advantage.

Coke Fires.

One of the methods at our command in endeavouring to increase our coke sales is to bring to the notice of our customers the available apparatus for consuming it, and, where possible, to have in our showrooms apparatus of various types on which practical demonstrations can be given. In this respect it may be remarked that there are now on the market two or three fireplaces in which a properly prepared dry coke of suitable texture can be burned with success and with satisfaction. To one or two of these a more or less automatic gas ignition apparatus has been added which makes the proposition a very attractive one to the housewife, who is thereby provided with a perfectly smokeless fuel, readily ignited, and revived if necessary, without the use of any wood, paper, or other extraneous fuel.

It may also be suggested that some attention should be paid to the design and provision of a coke-fired kitchener. The old kitchener was a very inefficient piece of apparatus, and was easily displaced by the gas cooker, but it should not be overlooked that some of the recently introduced coal fired kitcheners are extraordinarily efficient, and that there is a danger of their recovering some of the ground lost to the gas cooker. It must not be forgotten that, in the household where the kitchen is occupied by servants, the provision of cooking apparatus which cannot very well be used uneconomically is likely to be attractive. It is therefore put out as a suggestion that some of our research workers might very well devote some of their time to the perfection of a coke fired kitchener which would at least keep the cooking market within the Gas Industry.

Competition from Coke Ovens.

Having taken every possible precaution to maintain the fuel we offer at the highest quality, and having brought coke consuming apparatus within the reach of our customers, the next essential is to ensure that suitable transport facilities are arranged so that the coke can be delivered expeditiously and in convenient quantities to every part of our district. If we leave any part of this market unoccupied we shall be leaving a weak point at which our own market, even for gas itself, can be attacked by the increasing competition of the coke oven.

The tendency on the part of powerful interests outside the Gas Industry to exploit the coke oven for the sole purpose of supplying coke and gas in the field which should be occupied by ourselves, is a danger to which we should not

allow ourselves to be blinded. There is a perfectly legitimate sphere for the coke oven in the production of the specially hard fuel which is required in the iron and steel industry, and the recent introduction of more efficient ovens has resulted in the production of quantities of surplus gas, for which an outlet is quite properly sought. But while, no doubt, there are cases in which this surplus gas can be conveniently used by neighbouring gas undertakings, it is essential that they should safeguard themselves against failures of supply which, if too great reliance were placed upon this source of supply, might very well prove disastrous and costly. In general, it will be necessary to maintain gas making apparatus in a state of repair ready at short notice to supply any possible deficiencies, and in every case gas undertakings should keep the control and the initiative in this important matter.

Salesmanship.

It is now thoroughly well recognized that a live sales department is an essential portion of the organization of a gas undertaking, and this department should embrace the sale of coke as well as of gas. We are agreed that it is no longer sufficient to produce gas of good and constant quality, to deliver it to the consumer at constant pressure and without interruption. We must go further. We must see that the consumer is educated in the use of the commodity with which we have supplied him. Too often we hear complaints of " bad gas " from perfectly intelligent people when the real trouble lies in faulty regulation of apparatus, and while periodical visits by a maintenance staff will minimize dissatisfaction, the real remedy lies in instructing the consumer in the use of the apparatus. It is admitted that there are times when apparatus will function inefficiently on account of improper adjustment, or because of its imperfect design, but we must get our consumers to realize the real causes, and they must never be permitted to think that they are defects in gas as such.

Above all, we must use every method of publicity at our disposal to dispel the idea that gas is a " back number." Pessimism, " defeatism," in all its forms, must be eradicated from our minds and our policies. In spite of the intensive propaganda carried on in the Press, and even by members of the Cabinet, to engender the belief that to be up to date one must use electricity, the fact remains that even in these days of industrial depression the demand for gas still continues to increase. For cooking, for heating and for hot water service, gas can still provide a service which, on the grounds both of convenience and of economy, is definitely superior to that provided by electricity, and we should lose no opportunity of impressing this upon the public mind.

Progress in America.

The public must be disabused of the idea that gas is in some way out of date, and perhaps there is no better means of educating it in the true position than that of bringing home to it the facts concerning the tremendous and continuous growth in the consumption of gas in those very countries where electricity is most highly developed. These facts were exhibited in a striking manner by Mr. Clifford E. Paige, President of the American Gas Association, in his recent address to the Institution of Gas Engineers. He said that in the last decade the number of gas consumers in the United States had increased by 40 p.ct., while the sales of gas had increased by the enormous figure of 110 p.ct. During the same period the sale of manufactured gas to industrial consumers shows a gain of no less than 135 p.ct.

Possibly a still more remarkable figure is that relating to manufactured gas sold for house heating purposes. In 1930 this amounted to no less than 25,000 million c.ft., whereas in 1920 the quantity was practically negligible. It should be borne in mind, too, that these astonishing figures are exclusive of the huge volume of natural gas which is used in the United States. In 1930 this reached the colossal figure of 1,940,000 million c.ft., a figure which would be doubled if it were calculated on the basis of calorific values such as we are accustomed to instead of the 1000 B.Th.U., which is its average calorific value. It is true that some 42 p.ct. of this gas is absorbed within the oil industry, to which the natural gas is related, but the balance, reckoned on the basis of 500 B.Th.U., must be equivalent to something like 2,000,000 million c.ft. of gas sold to domestic and industrial consumers, similar to those whom we supply.

If these figures can be brought home to the public mind we should surely hear no more of the absurd idea that gas is in some way a " back number."

Domestic Lighting.

In the field of domestic lighting the difference in cost between gas and electricity is less marked than for purely heating purposes, and in recent years some considerable headway has been made by our competitors in this particular sphere. There is a tendency in some quarters to view this advance with equanimity, but I do not hold with this view. It is true that the intrinsic value of the load thus lost is negligible, but once the heavy cost of installation has been incurred there is little prospect of electricity being displaced in favour of gas, and it too often happens that the introduction for lighting is only the thin edge of the wedge. With even a moderate amount of lighting it often becomes an economical proposition to take the current on a rateable value basis, in which case the additional current consumed, should heating apparatus be brought into use, is obtained at very attractive rates; and even though the cost for a given heating capacity at the bare unit charge is generally several times in excess of similar service by gas, the fact remains that many people are prepared to pay the greater cost of what they believe to be the more modern service. Others are misled, by the low charge for the electrical unit, as compared with the charge for the therm of gas, into believing that the former is the cheaper, but in this respect the adoption of the new Gas Unit of 4000 B.Th.U. recently recommended by the National Gas Council will place in our hands a unit which, for comparative purposes, should do much to dispel this belief.

In our efforts to retain the lighting load it is my experience that there is little use in recommending gas on the score of lower cost. If a consumer is convinced that electricity can give a more satisfactory service he is quite prepared to pay for it, so our efforts should be concentrated more on stressing the superiority in quality of gas lighting and in seeing that our lighting service is beyond reproach. The best possible fittings should be put within easy reach of our consumers at the lowest possible cost where out-of-date or inefficient fittings are in use, the attention of the consumer should be drawn to the modern fittings and distance switches available; and burners should be inspected periodically and adjusted where necessary. Another method which I have found very successful in helping to retain our lighting is to fit free with every slot meter a gas lighting bracket, and this is a service of which our consumers have shown great appreciation. Our research organizations might, in addition, profitably direct their attention to the problem of the elimination of the soiling of ceilings by gas lighting. It is known that attempts have already been made to tackle this problem, and that these attempts have been attended with some success.

Street Lighting.

Whatever difference of opinion there may be as to the utility of endeavouring to retain our domestic lighting, there can be no doubt about the necessity of exerting every effort to retain our street lighting load. This load differs from the domestic load inasmuch as cost is as a rule a vital consideration with the lighting authority; and where competition is open, and cost and quality of lighting alone are the deciding factors, gas can more than hold its own, as is testified by the large installations which have recently been decided on after actual trials of both systems of lighting on adjacent stretches of roadway. Strenuous efforts are, however, being made in some places to oust gas lighting, even with the aid of Government grants; and we can only maintain our position in this field by constant watchfulness and by wholehearted endeavour to maintain our installations at the highest pitch of efficiency. Street lighting is one of the most telling advertisements at our command, and it lies with us to make it as effective as is possible. There are places where ineffective lighting has been allowed to stand as it has been for years, without any effort at improvement. The lighting authority may be dissatisfied, but, unaware of the potentialities of gas, assumes that the installation represents the best it can do. The field is then ripe for our competitors to come along with a scheme of improvement and to reap an easy victory; and even should a belated attempt on the part of the authorities succeed in saving the situation for gas, the Industry remains under the stigma of having been content to give an inefficient service until the threat of supersession arose.

A Forward Policy.

We must ourselves take the initiative as regards our street lighting and adopt a forward policy. It must be kept constantly under review, and where unsatisfactory conditions exist they should be brought to the notice of the lighting authority and a scheme for improvement submitted, accompanied, if necessary, by an offer to give an example at our own expense of what we can do.

In Belfast, in spite of active competition, we have been able to retain practically the whole of the street lighting in our own hands, there being fewer than forty electric lamps out of a total of approximately 13,000. In the centre of the city we make use of high-pressure lighting by lamps of 3000 c.p., while on the main roads leading from the city we

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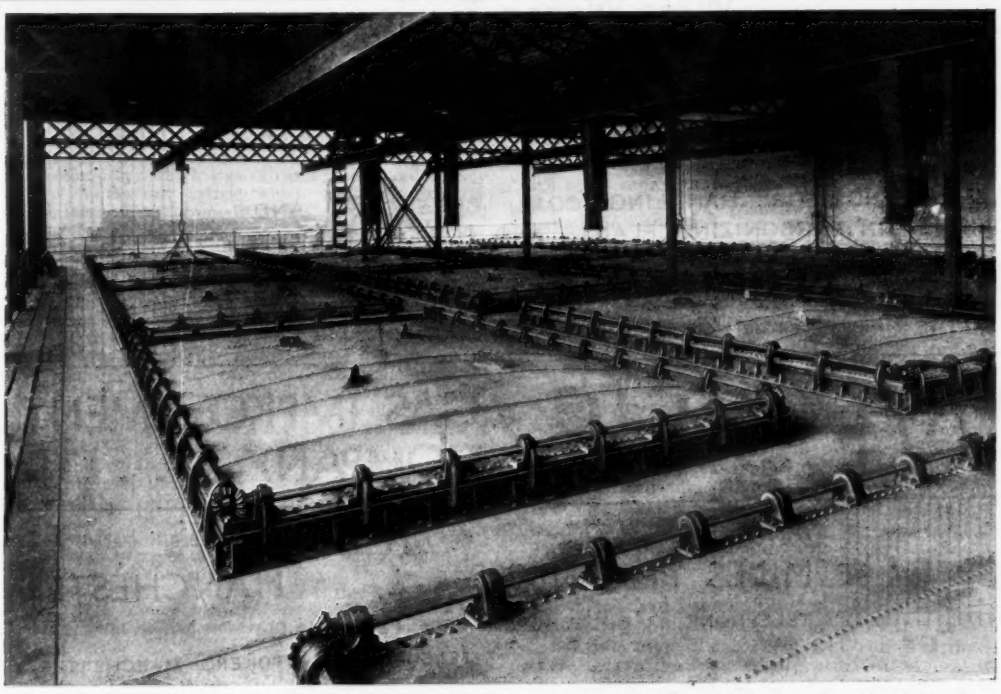

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have recently taken in hand the replacement of all the old pillar lamps by modern lamps of the suspension type. These we have suspended from the tramway standards, two to each standard, and the result has been most gratifying, as regards both lighting effect and in giving the street a more open and less congested appearance through the removal of the existing pillars. The public is quick to appreciate our efforts in this direction, and the improvement has been a source of frequent comment of highly favourable nature in the local Press; and these comments have not stopped at lighting alone, but have on occasion led to other eulogies upon the service in general which the Department is giving to its consumers.

Conclusion.

The manner in which we have been able to weather the widespread industrial depression gives us good cause to have every confidence in the future of our Industry. There is every indication that when conditions approach more nearly to the normal, there will be a greatly increased demand for heat and for power, and we must be always on the alert to see that this demand, when it arises, is filled by gas wherever gas can be suitably installed, whether it be for heating, for cooking, or lighting, domestic or industrial.

Discussion.

Mr. David Vass (Perth) said that the President had been most happy in his acknowledgment of the services of those who had been pioneers. Mr. Smith and himself were only two of those who were associated with the foundation of the Waverley Association. The first Secretary of the Association (Mr. Adamson), who was latterly connected with the Airdrie Iron Company, was a gentleman of outstanding ability. His early field was gas engineering, but he won distinction in general engineering circles. Another pioneer whose name he instantly recalled was Mr. Robertson, of Selkirk.

Support of Central Bodies.

Mr. George Braidwood (Coatbridge) mentioned that Mr. Smith was selling gas to industrial consumers at 1s. 10d. per 1000 c.ft., and at 2s. 2d. to domestic consumers. Their President had alluded to the magnificent work of the older managers. He had, however, omitted to tell them that the work had been done for practically nothing. At the present time they had a number of big associations and organizations which cost a great deal of money to run, and he felt that, if they were to get an adequate return for the money expended, they must make up their minds to support the policy that was advocated by these bodies. The President had spoken of the higher temperatures that were possible with vertical retorts, but personally he (Mr. Braidwood) was not particularly fond of high temperatures. He noticed from the address that Mr. Smith gave all his figures in cubic feet. His own view was that they ought to get away from that idea, and give all their figures in therms.

Salesmanship.

Mr. J. Richmond (Penicuik) remarked that he had appreciated what Mr. Smith had said on the subject of salesmanship, but he would remind the members of the Association that they had not a commodity which was of itself in demand. They must put on the market an article which was value for the money paid for it, and a commodity, too, which would sell irrespective of salesmanship.

Mr. James Bell (Dumbarton) observed that Mr. Braidwood appeared to regard high temperatures as risky. Personally he believed in high temperatures. Recently they had reconstructed their vertical retorts at Dumbarton, and this had enabled them to increase the production of the plant by 20 p.ct. So far as the working of vertical retorts was concerned, he considered that great improvements could be effected. The manufacturers of these plants would do well to concentrate their attention to refining the operation of gaseous firing. His own idea would be to eliminate dust from producer gas in the first instance, and some arrangement could be introduced for giving no more than the requisite quantity of gas in each combustion chamber. The settings would then last longer, and their temperatures would be maintained more level throughout the 24 hours of the day. In the initial stages of carbonization in vertical retorts, the coal entered the low-temperature zone. In that zone it was liable to produce uncracked vapours which went forward and deposited themselves, even to the extent of being found on the top of the water in the gasholder tank. He had found that to the extent of 10 or 12 p.ct., and it was due solely to the lack of cracking. If a higher temperature was used to do the necessary cracking, what he had referred to could be avoided.

COAL TAR OILS FOR INTERNAL COMBUSTION ENGINES.

The President said he proposed for the remainder of the meeting to deal with the discovery in regard to coal tar oils which had been made in Belfast, and which it was claimed, as the result of tests and investigations, could now be made suitable for use in internal combustion engines. He had brought samples of the oil with him to the meeting; and to show that it was non-inflammable he would pass a lighted match over the liquid. In connection with the Gas Undertaking in Belfast they had a well-equipped chemical works. Unfortunately the revenue in that department had been dwindling at the rate of £10,000 a year, and it became obvious that something ought to be done. The oil had evidently come to be a drug on the market and the price it was fetching was round about 1d. or 1¼d. per gallon. To his mind that was tantamount to giving the oil away. They thought it was worth at least 6d. a gallon. The oil which had that day been exhibited to the members of the Association was a light creosote oil properly washed with a caustic soda solution and 10 p.ct. of solvent naphtha was added. In course of time he hoped to be able to drop the 10 p.ct. of solvent naphtha.

The first test was made in March, 1929, using an unwashed fraction of light creosote distilling between 0·950 to 0·990 sp.gr., with 29 p.ct. of tar acids, and having a closed flash-point of 147° Fahr. The test was made with a mixture of 50 p.ct. crude oil and 50 p.ct. commercial petrol on an A.E.C. internal combustion engine controlled by a magneto, but the result proved most unsatisfactory. A further test was made with the oil washed free from tar acids, but this also was not a success, due to practically 40 p.ct. of the oil solidifying (naphthalene). They then decided to leave at least 15 p.ct. of tar acids in the oil, and upon the next test no naphthalene trouble was experienced, but after the oil had been left untouched for a few days they discovered, on cooling, at least 11 p.ct. of naphthalene. To hold this in solution they added 10 p.ct. of 90-190° C. water-white solvent naphtha to 90 p.ct. washed coal tar oil, and by this blend the naphthalene, which on freezing was found to amount to 8 p.ct., was held in solution.

They had a trial run with this blend, but the engine was slow on starting up, although when changed into second gear the running was less sluggish. They were, however, satisfied with the oil, which had now a closed flash-point of 128° Fahr., and they therefore came to the conclusion that more heat was necessary to gasify the heavier oil. The Belfast Omnibus Company, Ltd., upon whose engine these tests were made, inquired of Messrs. Solex Carburettors, Ltd., of London, as to a suitable carburettor for this quality of fuel, and one of their representatives called, and received a specification of the oil which it was intended to standardize. Several tests were made on a special carburettor obtained on loan from this firm, and although they showed an improvement on the previous trials they were still unsatisfied, and were of the opinion that really satisfactory results could only be obtained by pre-heating the mixture after it had left the carburettor and before it entered the engine. This was arranged by placing a manifold inside the exhaust chamber of the engine. The first trial under these conditions was made with equal parts of petrol and of washed oil, when the engine was found to run smoothly on all gear changes, and no loss of power was reported. After this successful trial the proportion of petrol was reduced by 10 p.ct. on each day's running, until the mixture contained only 10 p.ct. of petrol. It was then decided to fix up a separate tank to hold the coal tar oil, and owing to its high flash-point the Government Authorities gave permission for the container to be erected on the roof of the 'bus. This container was connected by means of a 1-in. diameter pipe to the special carburettor, and a second carburettor for petrol was fitted to the opposite side of the engine. The supplies of petrol and of coal tar oil were thus kept separate.

On completion of the alterations the engine was started up on petrol and was run until it was warm, when the petrol supply cock was shut and the tar oil cock opened. A journey of 25 miles was then completed on the tar oil fuel alone, and throughout the run a speed of 30 miles per hour was easily maintained. Other trials had been made on various gradients, and the reports had in every case been satisfactory. The Belfast Omnibus Company had for the past six weeks had four of their 'buses running on the tar oil to Portaferry and back, a distance of 28 miles each way, and the same Company expected to have an additional six 'buses running on the tar fuel by the end of the present month. After the report on the running of these ten 'buses had been submitted, it was anticipated that the remainder of their fleet would gradually be equipped.

On Saturday, June 13, a test run was made on two of these 'buses, and the results were highly satisfactory from the point of view of the Gas Undertaking. If benzole could be used for starting up from cold, these 'buses would be running on 100 p.ct. British fuel, and the use of foreign motor spirit would be eliminated. Tests, continued Mr. Smith, were carried out on the oil from the sumps of two of the engines after they had completed 1000 miles to determine whether the tar oil fuel was giving rise to excessive wear, as indicated by the presence of iron, and he was pleased to say that no iron was present. He would like to point out one important fact in regard to the use of the oil as a substitute for petrol. Whereas the sump filters had

to be cleaned every 3000-4000 miles at present, they would advise that they be cleaned every 1000 miles, on account of the quantity of carbon residue adhering to the filter gauze. They had now standardized the fuel, and the analysis of it was as follows: 90 p.ct. light creosote oil (washed) and 10 p.ct. of 90-190° C. water-white solvent naphtha.

Specific gravity	0·951
Tar acids	15 p.ct.
Carbon residue	0·34 ,,
Ash	0·04 ,,
Closed flash-point	129° Fahr.

Distillation Range.

Water.	Distillation Commences.	10	20	30	40	50	60	70	80	90 P.Ct.
Nil	148	180	189	198	206	213	221	230	244	273° C.

Tests made on the exhaust gases of two 'buses, one running on petrol, and the other on washed tar oil, gave the following results:

	Petrol. P.Ct.		Tar Oil. P.Ct.
Carbon dioxide	3·1	..	12·5
Oxygen	11·0	..	4·3
Heavy hydrocarbons	0·0	..	0·0
Carbon monoxide	4·2	..	0·3
Nitrogen	81·7	..	82·9
	100·0	..	100·0

These figures showed that coal tar oil used as a substitute for petrol in public service vehicles was less dangerous than petrol, owing to the small quantity of carbon monoxide in the exhaust gases. The only expense involved in the conversion of petrol engines for the use of the coal tar fuel would be in the provision of an additional carburettor, manifold, and fuel tank. Should this fuel be adopted throughout Great Britain for transport purposes, they would have discovered a new market for a material the value of which as a fuel had not been realized until now. He was perfectly satisfied there was a big future for the oil, and he was pleased that he had been able to make these details public for the first time to the members of the Waverley Association.

Mr. DAVID VASS said they of the Waverley Association had to thank Mr. Smith for placing the figures and results of his tests and experiments before them. He was glad that the point had been emphasized that this oil afforded the greatest measure of protection from fire as compared with petrol. The points that had been stressed that day were of national importance; and it was refreshing to reflect that they were going to have a new home product in place of petrol, the greater portion of which was imported from abroad. Their President, it seemed to him, had done a great service not only to the Gas Industry, but to British commerce, in bringing this subject forward.

Thereafter Mr. VASS on behalf of the members presented Mr. Smith with the medal of the Association.

Mr. SMITH, in acknowledging, said he was now in possession of four medals—viz., those of the North British Association of Gas Managers, the Institution of Gas Engineers, the Irish Association of Gas Managers, and last, but not least, the old Waverley Association.

On the motion of Mr. A. Dow (Galashiels), an honorarium of ten guineas was unanimously voted to the Secretary and Treasurer (Mr. R. J. Philp, of North Berwick).

The proceedings terminated with the usual votes of thanks which were proposed by Mr. JAMES JAMIESON (Edinburgh).

In the course of an interview given to representatives of the Press in Edinburgh, Mr. Smith urged that the greatest benefit of the new oil was to be found in the fact that the production cost was only about 4d. per gallon. Incidentally he mentioned that inquiries had been received from several foreign countries, asking for the conditions on which the new oil might be manufactured abroad.

SOCIAL AND RECREATIONAL.

Through the courtesy of the Willowbrae Bowling Club, Edinburgh, the members enjoyed a game of bowls on Thursday afternoon. The winning rink was skipped by Mr. James Gemmell, of Melrose, whose supports were Messrs. Robert Harvie, of Lockerbie; R. J. Philp, of North Berwick; and J. Richmond, of Penicuik.

The golf competition was played over the Baberton Course at Juniper Green. For the scratch prize there was a tie between Messrs. J. R. Stevens, of Elie, and J. Pollok, of Glasgow, each of whom returned a score of 75. The first handicap was won by Mr. A. Brown, of Edinburgh, and the second by Mr. P. Blackhall, of Edinburgh. Messrs. J. D. Smith (Belfast), M. A. Waddell (South Queensferry), and S. Hall (Edinburgh) tied for the third, fourth, and fifth handicaps. There was also a tie for the sixth, seventh, and eighth handicaps between Messrs. R. Hamilton (Dalkeith), W. Murray (Aberlady), and J. Ross (Glasgow).

Mr. J. O. Scott, of Messrs. Alder & Mackay, Ltd., Edinburgh, had charge of the secretarial arrangements for the golf, while Mr. R. J. Philp arranged the bowling competition.

On Thursday evening the golfing and bowling competitors, as well as many friends, had high tea together in Messrs. Ferguson and Forrester's, Edinburgh; while on Friday, at the close of the annual meeting, luncheon was served to a representative company in the North British Station Hotel, Edinburgh.

Scottish Junior Gas Association (Eastern District)

Valuation of Gas Undertakings—Pressure Variations—Showrooms

In the "JOURNAL" for June 3, p. 628, and for June 24, p. 947, we published the replies to several questions submitted at a meeting of the Association on May 16. The concluding questions and replies are as follows:

VALUATION OF GAS UNDERTAKINGS.

Reply by Mr. J. W. NAPIER, of Alloa.

The question was: *On what basis is the valuation for assessment of a gas undertaking (lands valuation) determined?*

The reply was as follows:

On this occasion, the subject of valuation of a gas-works for local taxation can only be dealt with shortly and simply. It is one which has created great differences of view as between gas accountants and assessors, and the different contentions have from time to time come under review and decision by the Valuation Appeal Court Judges.

Gas-works in Scotland are valued under the statutory direction of the Lands Valuation (Scotland) Act, 1854, Section 6. The instruction is to the effect that the valuation of an undertaking should be the rent it might be expected to let for, one year with another. The valuation, or rent, is ascertained on what is known as the "revenue basis." Gas-works are never actually let, and therefore the rent referred to is the amount to be paid by a hypothetical tenant.

The rent is ascertained on the broad basis that the tenant would pay the whole revenue under deduction of:

(*a*) Cost of working the business, including management and administrative charges, taxes paid as occupier, interest on capital not provided by the hypothetical landlord and expended by the tenant for the furtherance of the business, and if a company undertaking making profits, as distinguished from a Corporation not permitted to earn profits, a percentage to represent profits as the tenant.

(*b*) Sums paid for additions to plant, and sums for depreciation, being landlord's costs, are disallowed.

Municipal undertakings are dealt with the same as company undertakings except that in the case of the former no allowance is, of course, made for profits. The method by which the valuation is determined can best be demon-

strated by an example. The computation for a company undertaking is as follows:

Company Gas Undertaking.

LANDS VALUATION.		£
Profit for year 1930		2903
Add: Expenditure disallowed—		
Feu-duty	£ 15	
Owner's rates	427	
Renewals of plant	125	
Depreciation	350	
		917
		£3820
Deduct: Property separately assessed	£ 40	
Interest at 5 p.ct. on tenant's capital	669	
		709
		£3111
Less tenant's profits, 20 p.ct		622
		£2489

THREE YEARS' AVERAGE.	£
1928	1938
1929	2598
1930 (as above)	2489
3)	7025
Valuation for 1930	£2342

STATEMENT OF TENANT'S CAPITAL.		£
Movable plant, tools, &c.	£ 969	
Meters	4589	
Cookers	3675	
		9,233
Expenses £8481		
Less disallowances 917		
£7564		
One half whereof allowed as floating capital		3,781
Stock of coal—six weeks' maximum used		375
		£13,389
5 p.ct. thereon £669		

It should be noted that the practice of assessors is not uniform as regards the items comprising tenant's capital. For example, value of coal in stock prudently necessary to carry on the business varies, and may be six weeks' stock at time of maximum demand, one-sixth of the yearly requirements, or no specific allowance, this being contained in the sums granted for working expenses.

Moveable plant, described as tenant's chattels, includes a variety of plant and articles. Shortly stated, it comprises all expenditure incurred by the tenant which the hypothetical landlord does not provide. The landlord is only required to provide the plant necessary for the manufacture and distribution of gas—namely, plant from the retorts to gasholders, and main and service pipes. All else is provided by the tenant—briefly stated, these are moveable machinery, tools, appliances, fittings, oxide of iron in use and in stock, tar distillation and sulphate plant, consumers' meters and cookers, including fixing.

The allowance for floating capital, the sum necessary to finance the business, is not uniform; in some cases one-half the expenses, but frequently only one-third.

Finally, from the ascertained valuation there is allowed a deduction of 20 p.ct. before applying the assessment in accordance with the Rating (Scotland) Act, 1926.

PRESSURE VARIATIONS.

Reply by Mr. H. H. GRACIE, of Edinburgh.

The question asked was: *In modern gas distribution there are found decided variations in general pressure throughout the areas. What could be considered a suitable pressure if separate consumers' governors are not widely employed, and is the installation of such governors to be recommended? If so, could not meter manufacturers embody such an instrument in their product?*

The reply was as follows:

In reading this over, I felt that it was somewhat vague, and liable to misinterpreation. So, with a view to its elucidation, I asked your Secretary to give me as full particulars of the variations referred to, together with illustrations, and, if possible, the names of towns in which these variations are found; also, at the same time, to say whether these variations take place at different times of the day or night. His reply enlarging the query was as follows:

(1) Gas supply in many areas at present is carried out by throttling down the holder pressure to (say) 4 in. or 8 in., or even more, depending on the size and character of the holder. This function is the purpose of the station governor, which usually is set to give a predetermined pressure sufficient to afford at the utmost extremity of the area controlled by it, a pressure in conformity with the requirements of the Gas Regulation Act.
(2) These conditions imply that the pressure at appliances near the works will be much higher than at points of consumption farther away.
(3) We find, therefore, that different undertakings will require to know the pressure drop at the extremity, and possibly at the centre of gravity of the system, before deciding what figure of pressure to apply upon the outlet of the station governor.
(4) Variations are frequently brought home to us with the publication of charts, &c., in the Technical Press.
(5) Variations during the day or night are understood.
(6) The question asks what is a suitable figure of pressure and implies uniformity of service to all consumers whether near to or remote from a gas-works or holder station.
(7) The variations lie between 3 in. and 6½ in. water-column.

In reviewing these questions, it will be understood that there is considerable variation in procedure in different towns due to varying circumstances and requirements. To illustrate this point, I might remind you that many works are so situated that they have their governors located at the works sending the gas into different parts of the area. In other cases the works are some distance away, and the gas is sent from the works into district gasholders in the area. From these it is distributed through governors. In other cases governors are connected direct to the feeding mains from the works to supply the districts. Again, in other instances, high-pressure mains are introduced to boost up the low-pressure mains in the district. The initial pressure required is determined by a number of factors, such as the character of the district, the maximum quantity of gas to be delivered in a stipulated time, the size of the mains available, and the minimum pressure to be provided at any part of the town.

The question at issue appears to be chiefly " What could be considered a suitable district pressure where separate consumers' governors are not widely employed? " In considering this query, one has to keep in view the requirements of the consumers. If these include a large percentage of consumers using gas for lighting—which is a most desirable condition, and one we should all aim at—a pressure of from 30 to 35 tenths water-gauge in the consumers' premises should be aimed at. In order to secure this and provide against small mains, service pipes, and meters, and for the loss in pressure in the meters themselves, a pressure of from 35 to 45 tenths should be kept on the outlet of the governors, and this pressure should be maintained all day—say, from 7 a.m.—and night up to between 11 and 12 p.m. Between midnight and 7 a.m. it will be found that the consumption is small, and is due principally to street lighting. The pressure can therefore be reduced over that period, as the lamps burn directly off the mains. It may be found in some areas where the pipes are old and small that a pressure in excess of even 45 tenths is necessary to maintain a proper pressure in consumers' premises; but these cases can only be discovered by inspection, and in many instances the clearing and enlarging of the pipes and meters are sufficient. In order to discover whether the various districts throughout our area of supply are adequately supplied, we have an annual inspection made of the pressures. These are carefully reviewed and any deficiencies located and attended to. Further, we have maps prepared, and coloured to show the pressure in the different districts.

Even when consumers' governors are employed, it is desirable to have a good margin of pressure in the mains, and I would not suggest, even in such circumstances, that the pressure should be less than 30 to 40 tenths. In order to overcome the difficulties forecasted—viz., the pressure at appliances near the works being much higher than at points of consumption farther away—it is desirable to avoid any dead ends on the mains, and to see that all mains are coupled up so as to provide a circuit for the gas, thereby ensuring more uniform conditions of pressure. Another method would be to boost up the low-pressure mains, wherein the pressure falls too low by means of small high-pressure mains led into the district and coupled up thereto. This boosting should only be required at peak loads, and, indeed, it can be operated automatically, the high-pressure plant starting up when the pressure falls below a predetermined level. This is in operation in quite a number of districts.

Another very effective and practical solution of the difficulty is to provide a feeding ring main round the outskirts of the districts with governors taken off at the most suitable points. These are used to send gas into the districts from the outside edge, as it were, to boost up the pressure coming from the inside or centre of the district. With this scheme the different governors have to be synchronized so that a uniform pressure results. In older towns where pipes are small and the growth has been in different directions, this scheme has been very effective.

Whether consumers' governors should be recommended or not is a question which has been answered both in the

affirmative and the negative; and it is not considered wise to lay down any hard and fast rule. The circumstances in each case require to be considered; but, speaking generally, these appliances, when kept in proper order and regulation, and especially when the pressure in the mains varies, give very satisfactory results. Their first cost and cost of installation have militated more than anything else against their use. On the other hand, where the margin of pressure in the mains is small, these devices may only add to the difficulty of obtaining a proper supply within the premises.

To sum up, I think the ideal system of distribution is by a ring of high-pressure mains laid round the outskirts of the district with governors feeding into the low-pressure mains, also the discriminate use of district holders and district governors. Where this is not possible, small mains should be eliminated and mains of ample capacity provided to maintain a steady and ample pressure. Where pressures vary to any large extent, service governors should be provided free of cost to the consumer, as there is no more disturbing factor in the supply of gas than a variation in the pressure at the consumers' appliances.

As regards the provision by the meter makers of governors embodied within these measuring instruments, the provision of such a device has been suggested on several occasions, and has been the subject of patents, one of which was taken out by the late Mr. Daniel Macfie in 1904. In this case a diaphragm type of governor was fitted above the valve plate, and in order to provide for varying the pressure a weight was run backwards or forwards on a screwed rod actuated by a key from the front of the meter. The arrangement looked simple, but was not taken up to any extent, probably for the following reasons:

1. The space inside the meter is limited; consequently the diameter of the diaphragm in relation to valve area is restricted. This is more apparent in small meters than in the larger ones.
2. The number of turns the gas has to make in its passage through a meter already causes a loss of pressure. To add to this loss by fixing a governor as well, especially if it is at all restricted in size, may make the loss serious, and might prevent the meter passing its correct quantity with the 5 tenths loss of pressure allowed in the Sales of Gas Acts.
3. As at present constructed, meters are fairly simple; but the addition of a governor would somewhat complicate them. The effect is also to increase cost; and this more than anything else probably operated against its use. The cost of repairs would be increased, and also the amount of attention to the meter, as well as the risk of the meter having to be taken out for a fault which might be due to the governor alone, while the meter itself was in good order.
4. While a governor of even restricted size might be embodied in the ordinary meter, there would hardly be room for one in the prepayment type, and certainly less room in the high-capacity type which is now becoming so popular. The majority of makers of the latter type of meter use the top of this meter as a passage for the gas.

SHOWROOMS.

Reply by Mr. A. B. MUNROE, Chief Salesman, Edinburgh Corporation Gas Department.

The question was: *Do showrooms pay for small gas undertakings?*

The reply was as follows:

The question is not one which lends itself to a direct answer. One might just as well ask, "Do scrubbers pay in a gas-works?" Just as they are a necessary part for the preparation of the product from a gas-works, so is a showroom a necessity if you want to retain your business by educating your customers, present and potential, in the service gas can render them. There is no need for the manufacture of gas if you do not create a market for its use; and we have long since passed the time when gas was able to sell itself.

In a small gas-works—and by small I mean something under 10 millions per annum—the personnel usually at the disposal of the manager of such a works does not allow for showroom attendants; nor is the business of sufficient magnitude to justify the provision of a permanent showroom. But what is there to hinder (say) the North British or the Waverley Association of Gas Managers, or the B.C.G.A., hiring out a travelling showroom, by the week or month? It would be properly equipped with canvasser and demonstrator, so that each customer would be tackled by experienced salespeople. It would be necessary, of course, for a hall to be at the disposal of the demonstrator during her visit, so that she could give cooking lectures under decent and inviting conditions.

The visit of the showroom would be an innovation to many of the districts supplied by small gas undertakings, and the interest created would react in favour of the gas supply authority in a manner which would easily justify the expense incurred in the hire of the showroom and halls.

This mention of a travelling showroom is forced upon me as a result of the uninviting condition in which I have seen the showrooms of numerous small gas undertakings—uninviting because of their dusty and slovenly appearance, or because they were closed at the times I have visited them (between 9 a.m. and 5 p.m.), and also because of their out-of-the-way positions. Such methods do not make for business building; rather do they undermine the efforts of the enthusiastic salesman.

REGISTER OF PATENTS

Suction Service Cleanser.—No. 347,186.

KING, B. J., of Westgate-on-Sea.

No. 2039; Jan. 21, 1930.

This invention comprises an injector tube for use in conjunction with any type of pressure service cleanser in such way as to cause the compressed air contained in the aforesaid pressure service cleanser to create a powerful vacuum which is utilized in removing by suction the deposit from the gas service or other like pipe and transferring the deposit to a container. The injector tube consists of a venturi tube provided with inlet and outlet ends and a side connection to which the gas service is attached by suitable unions. The compressed air is discharged through the tube and the vacuum thereby set up in the side tube is utilized for removing the deposit to a canvas bag or other receptacle. The deposit is withdrawn from the gas service instead of being driven forward into the main; and the risk of stoppage by rust or moist deposit of the service pipe at a bend by the action of the pressure service cleanser is avoided.

Coke Quenching.—No. 347,424.

SOUTH METROPOLITAN GAS COMPANY and CARPENTER, C. C., both of 709, Old Kent Road, S.E. 15.

No. 9554; March 25, 1930.

Owing to the nature of the site or other cause, material frequently has to be deposited in the quenching trough at a point too near to the separating device to allow of the proper time contact for quenching before entering the separating device. The object of this invention is to provide an arrangement in which this defect is overcome.

A weir is formed across the trough immediately in front of the water separating device, this weir presenting an inclined face to the direction of the stream flowing down the incline of the trough, so that the depth of the water is increased above the normal in front of the weir, the speed at which the coke is being carried along the bottom of the trough is decreased, and the coke accumulates in front of the weir and is sufficiently quenched before being floated over the weir on to the separating device. The weir may be made adjustable as to its height, to regulate the submersion of the coke and the time contact for quenching, and water jets may be introduced through the sides of the trough and directed towards the water separating device to assist in carrying the coke over the weir.

No. 348,308.

No. 9555; March 25, 1930.

Hitherto all the water has usually been introduced at the end of the coke conveying trough furthest from the separating device, and it has been found that in plants where the trough is curved, the coke is thrown up on the side of the trough at the curved portion, thus holding up the coke, which in turn holds back the water until the depth becomes sufficient to break down the obstruction; and on the resumption of the flow, choking of the separator takes place.

The object of this invention is to provide means for overcoming this defect. An auxiliary water supply is introduced through the trough wall on the inner or outer circumference, or both, of the curved portion, normal to, or at any other suitable angle to, the stream of coke and water.

Automatic Cut-Offs for Water Heating Appliances.—No. 347,518.

BRILL, A. P., of Pittsburgh, and the RUDD MANUFACTURING COMPANY, LTD., of Slough.

No. 16,787; May 30, 1930.

According to this invention, the automatic gas cut-off device comprises a valve adapted to control the passage of gas to a burner or series of burners, a cam lever or its equivalent for initially opening the valve, a heat-responsive element adapted to maintain the valve open after the heat-responsive element has attained a certain temperature, and cause the cam lever or its equivalent to return to its normal inoperative position, the valve having a coiled or other spring associated therewith adapted to cause the valve to close in the event of the temperature of the heat-responsive element falling below a certain point.

A further feature is to employ a main valve for controlling the passage of gas to a main burner or a series of burners, and an auxiliary valve for controlling the passage of gas to a pilot jet, means being provided for initially opening the auxiliary valve. A heat-responsive element is provided which, on reaching a certain temperature, opens the main valve and also causes the operating means for initially opening the auxiliary valve to return to its normal inoperative position. Both valves are then maintained in their open position solely by means of the heat-responsive element, and means are provided for returning the valves to their respective seatings in the event of the temperature of the heat-responsive element falling below a certain point. With this arrangement, in the event of a jet or flame from the main burner or series of burners and pilot jet being accidentally extinguished, both valves will be closed automatically when the temperature of the heat-responsive element falls below a certain point, thus preventing the escape of gas from the pilot jet, in addition to preventing the escape of gas from the main burner.

Quick-Release Gas Unions.—No. 347,844.

SOUTH METROPOLITAN GAS COMPANY and CHANDLER, D., both of 709, Old Kent Road, S.E. 15.

No. 10,023; March 28, 1930.

This invention relates to quick release gas unions of the kind in which a valve, which cuts off the supply of gas, is automatically opened when the two parts of the union are joined, and more particularly to a union of this kind in which the valve comprises a spring-urged valve member.

In a gas union constructed according to the invention, the inter-engaging parts of the union are conical, and tight contact is formed between the conical surfaces by a member which is rotatably mounted on one member of the union and is provided with abutments which can pass through apertures in a flange on the other member, and co-operate with wedge-shaped surfaces on the flange. Preferably there is provided a closure cap having abutments which can pass through the apertures and co-operate with the wedge-shaped surfaces.

Laundry Irons.—No. 347,997.

JAMES KEITH & BLACKMAN COMPANY, LTD., and KEITH, G., both of 27, Farringdon Avenue, E.C. 4.

No. 26,438; Sept. 4, 1930.

This invention, which relates to gas-heated laundry irons, is devised to avoid any possibility of whistling of the flames. The sole of the iron is formed all round the edge with a thick upstanding wall intersected by sawcuts not only at the sides of the iron, but also at the back. Approximately centrally of the sawcuts holes are drilled through the wall either vertically or at a slight inclination. In that portion of each sawcut between the hole intersecting the same and the inner chamber bounded by the wall there is inserted a corrugated metallic strip, reducing the area of the passage presented by the sawcut and constituting a burner head leading into the relative hole.

With this arrangement the flames burn inside the holes, the products of combustion being discharged through the outer portion of each of the sawcuts, and being robbed of their high temperature in the process. In this way heat is transmitted directly to the metal structure of the sole, while liability to singeing of the goods being ironed by the escape of the hot products is avoided. Formed round the top of the wall is a groove connecting the upper ends of the holes, this groove being traversed by openings leading to the exterior. By holding a light to any of these openings the entire set of burners may be lit.

Gas Burner Injectors.—No. 346,969.

REGENT MALLEABLE CASTINGS, LTD., and DAVIES, A. E., both of Bilston.

No. 10,048; March 29, 1930.

This invention relates to a silent and adjustable gas burner injector which may be used to advantage irrespective of the pressure of the gas supply. It comprises a fixed inner tubular member having a series of lateral openings communicating with an outer adjustable screw cap, adapted to co-operate with a series of longitudinal tapered grooves on the outer surface of the inner member for varying the supply of gas, and a series of openings, which are permanently open, in the outer end of the tubular member.

Manufacture of Carburetted Water Gas. No. 348,501.

HUMPHREYS & GLASGOW, LTD., of Westminster (Assignees of PERRY, J. A., of Swarthmore, Delaware).

No. 31,395; Oct. 20, 1930. Convention date, Nov. 20, 1929.

The object of this invention is to provide improvements in the manufacture of carburetted water gas when utilizing carburetting oils which produce relatively large quantities of coke on vaporization. Such oils, if vaporized, according to the usual carburetted water gas practice, in a checker-filled carburettor, deposit sufficient carbon to clog the checker-brick in a short time. The frequent cleaning necessary is expensive and reduces, if not cancels, the economy that might be attained by the use of these relatively cheap oils.

According to the invention, the high coke oil is sprayed on to the top of the fuel bed, and the heating of the top of the fuel bed is increased during the blasting operation, and also during the run, by providing a refractory pier extending upward within the fuel bed to its top or to within close proximity to its top.

During the air-blasting operation, the pier stores heat, which it continues to radiate to the fuel bed during the water gas run. A portion of this heat is radiated directly to the fuel in the top of the fuel bed, and is available during the run for the increased vaporization of the oil. The pier also heats the up-run water gas rising through the fuel bed near it, which increased sensible heat is available for oil vaporization.

The pier also serves to heat the top of the fuel bed to a greater degree during the air-blasting operation, as it secures a more uniform distribution of the resultant hot air blast gases through the top of the fuel bed, and brings them in contact with more fuel. This increased extent of contact is of importance, as the time of contact with the fuel is short. The increased contact results in an increased storage of heat in the top of the fuel bed, during the air blast, which is available for increased oil vaporization during the run.

If the pier is arranged to project above the top of the fuel bed, radiant heat from the pier aids in vaporizing the finely divided oil, falling through the space above the fuel bed. In such case, it is preferred to spray the oil substantially clear of the pier, to prevent the rapid growth of a carbon accumulation on it.

Hydrogenation of Tar Oils.—No. 348,803.

GAS LIGHT AND COKE COMPANY, GRIFFITH, R. H., and BRUCE, R. N. B. D., all of Westminster, S.W. 1.

No. 10,066; March 29, 1930.

This invention relates to the destructive hydrogenation of high-boiling hydrocarbons, with the formation therefrom of hydrocarbons of lower boiling-point. The invention has particular reference to the production of motor-spirit. The low-boiling hydrocarbons which are produced in the destructive hydrogenation of high-boiling hydrocarbons such as tars, oils, and pitches, correspond as to their chemical composition to the raw materials from which they are produced. Thus, raw material rich in paraffin-hydrocarbons will yield a motor-spirit correspondingly rich in paraffins, and a raw material rich in cyclic closed-chain hydrocarbons will give a motor-spirit also rich in this type of hydrocarbon. This invention proposes to take advantage of this fact. Selected proportions are taken of a material rich in open-chain hydrocarbons and a material rich in cyclic hydrocarbons. These are blended, and destructively hydrogenated to produce a low-boiling mixture containing a predetermined ratio of cyclic to open-chain hydrocarbons.

The ratio of open-chain compounds to closed-chain compounds will be materially smaller in the destructively hydrogenated product than in the blend of raw materials. A gas-oil blend—the composition of which was as follows: Paraffin hydrocarbons 68 p.ct., unsaturated hydrocarbons 4 p.ct., aromatic hydrocarbons 19 p.ct., and naphthene hydrocarbons 9 p.ct.—was submitted to destructive hydrogenation in the presence of a mixture of molybdenum and boron, the molybdenum constituting a catalyst to the reaction and the boron a promoter to the catalyst. The hydrogenation process was effected in the presence of hydrogen at a temperature of 460° C. and under a pressure of about 200 atmospheres. The amount of catalyst used was such that to every 100 parts by weight of the gas-oil blend treated there were present in the hydrogenation chamber 5 parts of the molybdenum-boron mixture. The product of the reaction was a spirit containing 48 p.ct. paraffin hydrocarbons, 3 p.ct. unsaturated hydrocarbons, 29 p.ct. aromatic hydrocarbons, and 20 p.ct. naphthene compounds.

It is an important advantage of the invention that by blending open-chain compounds, such as hydrocarbons of the paraffin series with closed-chain cyclic compounds, such as aromatic compounds and naphthenes, the reaction, which would otherwise be strongly endothermic and, therefore, difficult to control, is much more easily controlled and maintained at the correct temperature.

Corporation Undertakings' Results for 1930-31

ACCRINGTON.

In the annual report of Accrington District Gas Board, the Manager, Mr. A. J. Harrison, said they had reduced the unaccounted-for gas by 10 million c.ft.—an extraordinary reduction. The gross profit was £40,377. After meeting various charges, there was a surplus of £7218, which, added to revenue reserve, left £12,263 in the gas revenue reserve.

BELFAST.

The annual report of the Engineer and Manager of the Belfast Gas Department (Mr. J. D. Smith) discloses a gross profit on the manufacture and sale of gas and residuals of £150,566, being an increase of £3360 as compared with the previous year. This gross profit, says Mr. Smith, has only been exceeded on two occasions, and given normal conditions I have no doubt but this will be greatly increased. There has been no change in the price of gas during the past year, and the increase in sales is due to expanding business. Prices, however, of our residuals have been steadily falling for the past three years, and we have suffered, therefore, a serious drop in our revenue from these sources.

The net profit for the year is £90,821. From this £18,808 is set aside for redemption of stock and mortgages, leaving £72,004, to which is added the balance brought forward from last year, making a total of £104,706. Various allocations together with interest and sinking fund on the new City Hall stock absorb £60,550, leaving £44,155 to be carried forward to the credit of appropriation account, as against £32,702 last year.

The revenue from the sale of gas and public lighting shows an increase of £13,925. There was a decrease in expenditure of £7998 for repairs and maintenance, £2980 for oil, £1991 for water gas, and £1791 for mains. There was a decrease in revenue from stoves of £1166, coke £1802, tar products £2372, and ammonia products £2256. On the other hand, due to the larger quantity carbonized and higher price paid, there was an increase in expenditure for coal of £3555, carbonizing wages £4064, and coal gas purification £2031.

The increase of gas made over the previous twelve months was 1·41 p.ct., or 59,466,000 c.ft. The total gas made was 4266 million c.ft. Of this 73·45 p.ct. was coal gas and 26·55 p.ct. water gas. During the year 176,447 tons of coal were carbonized, an increase on the previous year. Coal cost slightly more—about 4·7d. per ton. The quantity of oil used was 2,048,338 gallons, a decrease on the previous year of 158,293.

BOLTON.

The gross profit for the year is £55,550, being an increase of £8958 over last year. £4763 has been allocated as revenue contribution to capital, and £10,000 has been transferred to renewals fund. Out of the renewals fund £14,840 has been expended during the year, leaving a balance of £30,670. The prices received for tar have shown a further drop since the last report. while the value of the ammoniacal liquor sold is less than the cost of working it up to a saleable commodity. The returns for residuals are down by 0·39d. per 1000 c.ft., equal to £1993 on the total output of gas. It is satisfactory to note, however, that the cost of manufacture has been reduced by 2·11d. per 1000 c.ft., equal to £10,782.

Bolton is still suffering from the trade depression, and despite an increase of over 2700 gas appliances during the year the total gas sold shows a reduction of about 24 million c.ft. With this reduced load the Gas Street Station, with the recent introduction of new plant, successfully carried the load. The older setting at Gas Street works has now been in use for ten years, and will in the near future require considerable overhaul, necessitating the use of the Lum Street plant for the time being. The yield of gas per ton of coal has shown an increase over last year, and is partly accounted for by the higher efficiency of the Gas Street plant. The Lum Street works is being used as a distribution centre for gas and small coke sales, while a limited staff is carrying out necessary repairs on the carbonizing plant so as to put this into condition for use when required.

The following are comparative statistics for the past two years:

	1931.		1930.
Tons of coal carbonized	72,192	..	75,772
Average cost per ton	18s. 11d.	..	19s. 8d.
Gas made in c.ft.	1,294,804,000	..	1,326,563,000
Gas made per ton carbonized	17,935	..	17,507
Gas accounted for in c.ft. per ton carbonized	17,237	..	16,835
Gas unaccounted for per cent. through leakage and condensation	3·89	..	3·84

BRIDGNORTH.

The accounts of the Bridgnorth Gas Undertaking for the past year state that the revenue account shows a surplus of £725, against a surplus last year of £1703. This decrease is due to the price of gas being reduced, and a reduced income from the sale of residuals. The quantity of coal carbonized showed a decrease of 93 tons. The net revenue account shows a credit balance of £7786, against a credit balance last year of £7168.

BURTON-ON-TRENT.

The report of the Burton-on-Trent Gas Undertaking for the year ended March 31 last shows that the total sales of gas for the year amounted to 421 million c.ft.—a decrease of over 21 million c.ft. as compared with the previous year, or 4·81 p.ct., which in view of the difficult year the Committee considered satisfactory. On the expenditure side it was reported there was a reduction of total working expenses of £3855, from £86,759 to £82,904. The net result of the year's working was a surplus of £3328, as compared with a deficit for the previous year of £3612, or an improved trading result for the year of £6940.

CARLISLE.

The yield of coke and breeze (20,867 tons) is equal to 13·26 cwt. per ton of coal carbonized, and the quantity sold (14,990 tons) has realized £10,518, a decrease of £368 on last year's figure. The price of tar continued to fall during the whole of the year, so that in the last month of the year the undertaking were receiving no less than 13s. 4d. per ton below the figure with which they commenced the year. The result of this decline in price is reflected in the tar revenue, which is down by £632. The figures relating to the amount of gas made and sold, compared with the preceding year, are as follows:

	1930-31.		1929-30.
Gas made, c.ft.	601,194,000	..	600,451,000
Gas sold (private rental), c.ft.	523,383,500	..	529,917,200

The financial results for the year, after providing for income-tax, interest, loans repayment, &c., show a net profit of £1916, as against a net loss of £322 for the preceding year. The number of consumers based on the number of accounts for this year is: Ordinary meters, 5058; slot meters, 11,797; a total of 16,855.

CONGLETON.

The financial side of the gas undertaking was referred to by Alderman F. Jackson at a meeting of the Congleton Borough Gas Committee. He said the accounts for the year showed a profit of £469, and to avoid the payment of income-tax, the price of gas had been reduced so that the consumers could have the benefit of the success of the undertaking.

LINCOLN.

The year's working shows a gross profit of £13,306, compared with £12,621 on the previous year, an increase of £685. After deducting debt and interest charges there is a net profit of £4706, an increase of £713 over 1929-30. If the sum of £3944 used for mains, cookers, meters, and additions, which has been taken out of revenue, had been placed to capital, which could quite legitimately have been done, the net profit would have been £8650. The total quantity of gas sold resulted in an increased income of £2150. There is a balance of assets amounting to £260,786, or £171,128 more than the total liabilities. The gas made during the year reached a total of 533,326,000 c.ft. The Distribution Department continues to expand, 364 new customers being added during the year, and 539 new cookers fixed. In addition, 1718 cookers have been repaired and renovated by the undertaking's own employees. The number of consumers is 17,383, of whom 11,069 are users of gas cookers. The total length of mains is slightly over 97 miles. Progress made during the last 12 months is very remarkable in view of the general trade depression in the city.

NELSON.

The expenditure on revenue account during the year has been £79,298, or £1510 less than the estimated expenditure; while the income has been £117,597, or £3859 less than the sum estimated. The result is a gross profit of £38,299, and a net profit of £20,798. During the year 24,611 tons of coal have been carbonized—all at the Brierfield Works—and the total quantity of gas made has been as follows: Coal gas made at Nelson Works, *nil;* coal gas made at Brierfield Works, 546,152,000 c.ft.; carburetted water gas, 27,567,000 c.ft.; total, 573,719,000 c.ft. The gross income from residuals and bye-products has been £14,531, as compared with £14,249 obtained the previous year, and after deducting all the expenses of manufacture and handling of same, the net income from this source amounts to £12,266, as compared with £10,296 last year. The total quantity of gas delivered during the year has been 573,792,000 c.ft., being a decrease of 8,531,000 c.ft., or 1·46 p.ct., on the quantity delivered last year. As compared with last year, ordinary meters show a decrease in consumption of 15,694,900 c.ft., or 7·31 p.ct.; prepayment meters an increase of 60,600 c.ft., or 0·02 p.ct.; making a net decrease by meter consumers of 15,634,300 c.ft., or 3·16 p.ct. Street lamps show an increase in consumption of 5,493,200 c.ft., as compared with last year; shop lamps a decrease of 90,900 c.ft.; and the gas consumed in works is increased by 1,312,100 c.ft. The unaccounted-for gas has increased by 391,400 c.ft., and now stands at 4·26 p.ct. of the total quantity of gas made, as compared with 4·14 p.ct. last year. Cookers, boilers, and fires on simple hire number 6139, the year's installations aggregating 150, compared with 163 last year. Small breakfast grillers, for which no rent is charged, number 2055, compared with 2097 last year. Water heaters of various types are increasing in favour, as shown by 127 new installations. Cookers, boilers, fires, geysers, and other appliances, in all numbering 3568, have been dealt with by the stove department.

STAFFORD.

The revenue account showed a gross profit for the year of £16,651, compared with last year's figure of £11,921, an increase of £4729. This increase was mainly brought about by a decreased expenditure of £700 on coal, £3000 on repairs to mains, £600 on rates, and net fluctuations in other expenditure of £570. Income from the sale of gas showed an increase of £1000. The net profit on the year's working was shown at £5547. The appropriation account showed a balance to carry forward of £6402, compared with £5401, the increase being approximately the amount of back relief obtained by the reduction in the rating assessment. The amount of gas made was 360,896,000 c.ft., compared with 367,474,000 c.ft., last year, being a decrease of 16,578,000 c.ft., or 4·51 p.ct. This left 13,298,800 c.ft. unaccounted for, or 3·8 p.ct., the same as last year.

Councillor G. Owen (Chairman of the Committee), in moving the adoption of the report, mentioned that since 1878 the Gas Committee had given £89,300 towards the relief of the rates of the borough. The report was adopted.

STOURBRIDGE.

The sales of gas on prepayment meter and public lighting accounts have remained practically stationary, while the sales by ordinary meter have been reduced by nearly 10 million c.ft., principally on industrial supplies, owing to the depression in trade. The gas unaccounted for shows a further improvement. The revenue account expenses are fairly normal, except in the case of rates and taxes, which show an increase of over £500. Income from the sale of gas has decreased by about £845, while the rental of meters and stoves is slightly up. Coke prices have been strong during the year, and the returns show an increase of over £1300, while tar has not been reduced as much as was expected, being only £660 down. Sulphate of ammonia shows a loss of nearly £300, making a difference from last year under this heading of nearly £1000. The gross profit is £20,543, being a decrease of £1520. The balance from revenue account is subject to the usual deductions for income-tax, annual instalments, expenditure on mains, services, &c. The surplus, after these deductions, is £3224, a decrease on last year of £1009. Both sections of vertical retorts have given good service during the year. The alterations to purifiers and the new borehole (both of which have been charged direct to contingency fund) have given great satisfaction.

STRATFORD-UPON-AVON.

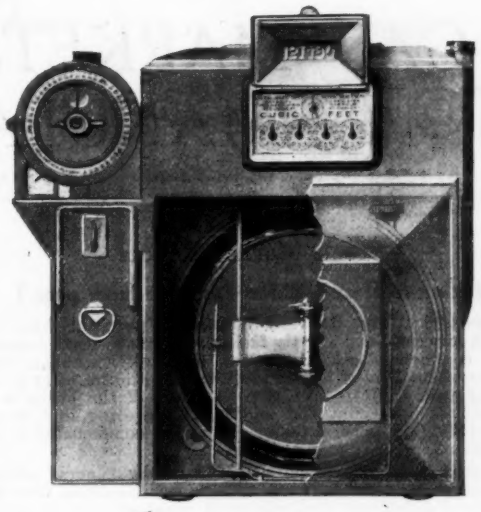
In his annual report to the Town Council, the Engineer and Manager (Mr. F. Shewring) states that it is gratifying to note that gas sales have increased by 3,269,900 c.ft., equal to 2·6 p.ct., and that the business of the Department still continues to develop. The gross profit for the year is £3711, a decrease of £1593 on the previous year. The net profit is £653. Dealing with the expenditure, the chief items calling for comment are: Carbonization cost £13,479, against £11,874 last year, due principally to more coal being carbonized; purification cost £134, a decrease of £37; repairs and maintenance charges are down by £480; maintenance of mains and services expenses are less by £532; meters and repairs £1347, against £1442; street lighting cost £71 more; fitting and residuals costs are about the same; cookers and maintenance costs are up by £43; rates and taxes are £1584, against £1392 last year, and £910 the previous year, an increase of £192.

The sale of gas shows a decrease of £500, due to the price of gas being reduced after last June readings. Cooker and meter rents remain about the same as the previous year; revenue from coke is up by £477, more coke being produced and sold; tar sales decreased by £413, due to lower prices ruling; ammonium sulphate revenue is less by £127 (the plant was not operated regularly throughout the year); fittings realized £2078, against £2678; bad debts and allowances were £139, against £110.

Submitting the minutes for confirmation, Alderman Ballance said that, compared with the estimate, the net profit was up. In framing the estimate for the year ended March 31, 1931, the Committee calculated on a modest surplus of £189. The price of gas was reduced by 2d. per 1000 c.ft., and it was thought that that would entail a loss of £980. That was based on the assumption that the consumption of gas would be the same, whereas there was a welcome increase in sales, reducing the £980 to £479. Adding the estimated surplus of £180 brought the figure to £668, and the actual surplus was £653, so that there was not much difference between the two. It was proposed further to reduce the price of gas by 1d. per 1000 c.ft., which would mean a diminished revenue of £399.

WITHNELL.

The closing of Messrs. Marriage & Pinnock's Mill at Withnell has materially affected the consumption of gas, as revealed by the Gas Manager's report to the Withnell Council. During the year, the total gas manufactured was 18,541,000 c.ft.—a decrease of 1,448,000 c.ft. In this decrease the mill closing accounted for 600,000 c.ft. The Manager (Mr. W. S. Alker) further stated that the gas manufactured in 1919 was only 13,019,000 c.ft., against 18,541,000 c.ft. in the year under review. This showed an increase of 5,522,000 c.ft. over the figure for the last eleven years, a remarkable result considering only about six houses had been built during that period. Over 50 gas cookers had been installed and the fire wash-boiler was being replaced by the gas boiler. Coke manufacture totalled 865 tons, of which 584 tons were sold, and 281 tons used on the works. The expenditure in coal was £1614, against £1919, and there was a saving of £173 on this account, through buying coal in the open market and not by contract as formerly. The price of gas was 4s. per 1000 c.ft.



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GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The results of Mr. Hoover's War Debts proposals have been very encouraging, and greatly facilitated a much-needed restoration to confidence. All sections of the Stock Exchange, therefore, closed on Friday last in a spirit of optimism after a week of rising prices. It is true that the bulk of the business was on professional account due to "bear" covering, but brokers reported that the general public are at last commencing to take more interest.

Gas stocks and shares participated in the general advance, and were particularly buoyant. There was no doubt that more stock than usual was available on account of sales to provide funds for more speculative purposes; but that buyers predominated was evidenced by the fact that no less than sixteen issues improved in value.

Apart from a 10 point increase in Imperial Continental ordinary to 325-345, debentures made the best showing. Tottenham 4 p.ct. led, with a gain of 3 points to 78-81; while Commercial, Gas Light, and South Metropolitan 3 p.cts. each improved 2 points. Many debenture stocks were marked *ex* div. last week, but the quotations remained unchanged; and in the case of Maidstone 3 p.ct., an increase of 1 point to 55-58 *ex* div. was recorded. Ordinary stocks were also well supported. Among these to show improvement were Gas Light £1 units by 3d. to 19s.-20s., South Metropolitan, South Suburban, and Tottenham with a rise of 1 point each, and (on the Nottingham Exchange) Derby consolidated gained 2 points to 122-125. The only reductions in value were Oriental ordinary by 2 points to 98-103, and a fractional drop in Liverpool 5 p.ct. at the local Exchange.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *June* 29.

The following are the values of tar products to-day:

Pitch, 45s. to 47s. 6d. per ton f.o.b.

Creosote, for export, varies from 4d. to 5d. per gallon f.o.b. according to specification.

Pure toluole is 1s. 11d. to 2s. per gallon; pure benzole, 1s. 5d. to 1s. 6d. per gallon; 95/160 solvent naphtha, 1s. 4d. to 1s. 5d. per gallon in bulk *ex* sellers' works.

Pyridine bases are about 3s. 3d. per gallon.

Tar Products in the Provinces.

June 29.

The average prices of gas-works products during the week were: Gas-works tar, 17s. 6d. to 21s. 6d. Pitch—East Coast, 47s. to 47s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 47s. to 47s. 6d. f.o.b.* Toluole, naked, North, 1s. 7¼d. to 1s. 7¾d. Coal-tar crude naphtha, in bulk, North, 5¾d. to 6¼d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3d. to 3¼d.; low gravity, 1¼d.; Scotland, 3d. to 3¼d. Heavy oils, in bulk, North, 5⅜d. to 5⅝d. Carbolic acid, 60's, 1s. 1d. to 1s. 2d. Naphthalene, £10 to £12; Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *June* 27.

Market continues uninteresting, although "*ex* contract" deliveries are well maintained. Quotations are substantially as recorded last week.

Pitch.—Export value for forward delivery is 40s. per ton f.o.b. Glasgow. Home market remains quiet, with value at 35s. to 37s. 6d. per ton *ex* works.

Refined tar to Ministry of Transport Specification is in good call, but quotations remain at 2⅝d. to 2⅝d. per gallon f.o.r. makers' works.

Creosote.—Trading continues quite active in the best grades. B.E.S.A. Specification is 2⅝d. to 3d. per gallon; low gravity, 3½d. to 3¾d. per gallon; and neutral oil, 3¼d. to 3½d. per gallon—all in bulk *ex* works.

Cresylic.—Business is dull and quotations are irregular. Pale, 97/99 p.ct., is 1s. 3d. to 1s. 4d. per gallon; dark, 97/99 p.ct., 1s. 2d. to 1s. 3d. per gallon; and pale, 99/100 p.ct., 1s. 5d. to 1s. 6d. per gallon—all f.o.r.

Crude naphtha.—Little business is being arranged, but value is steady at 4¼d. to 4½d. per gallon f.o.r. works.

Solvent naphtha is in slightly better demand; 90/160 grade being 1s. 3d. to 1s. 4d. per gallon, and 90/190 grade about 1s. 1d. per gallon.

Motor benzole.—Production is low, and value is steady at 1s. 3d. to 1s. 4d. per gallon f.o.r. in bulk.

Pyridines remain dull. 90/160 is 3s. to 3s. 3d. per gallon, and 90/140 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole:

	s. d.		s. d.	
Crude benzole	0 6¼	to	0 7½	per gallon at works
Motor "	1 1	"	1 2	" " "
Pure "	1 5	"	1 6	" " "

New Capital Issues.

Littlehampton Gas Company.—The tenders sent in for the 2200 "B" ordinary shares, which were offered on behalf of the Directors of this Company, were opened on June 23. A total of 6360 shares were applied for at prices ranging from £6 5s. 6d. down to the minimum of £5 15s. per share, the lowest accepted tender being at £6 2s. 9d. per share.

Trade Notes.

Spiral-Guided Holder for Whitby.

An order has recently been received by Messrs. Newton, Chambers, & Co., Ltd., of Thorncliffe Ironworks, near Sheffield, from the Whitby Gas Company for a two-lift spiral-guided gasholder.

Intermittent Chamber Ovens for Westgate.

Messrs. W. J. Jenkins & Co., Ltd., have received an order from the Westgate and Birchington Gas and Electricity Company for an installation of intermittent vertical chamber ovens having a capacity of half-a-million c.ft. per day.

Contracts Advertised To-Day.

Booster.

The Gas Department of the Sidmouth Urban District Council invite tenders for the supply and erection of a motor driven booster. [Advert. on p. 52.]

Oxide of Iron.

The City of Salford invite tenders for the supply of oxide of iron purifying material. [Advert. on p. 52.]

Tar and Liquor.

The Gas Committee of the Loughborough Corporation invite tenders for the purchase of their surplus tar and ammoniacal liquor. [Advert. on p. 52.]

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. June 26.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C. ...	77—82	...	...
522,992	,,	,,	4	4	Do. 4 p.c. Pref. ...	75—80	...	78—79
1,551,868	,,	Apl. 9	7⅞	7⅞	Alliance & Dublin Ord. ...	102—107	...	105—105½
374,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb. ...	72—77	...	...
522,655	,,	Mar. 5	7	7	Barnet Ord. 7 p.c.	124—129	...	...
300,000	1	Apl. 23	1/4⅛	1/9⅜	Bombay, Ltd.	16/6—18/6	...	17/-
174,500	10	Mar. 5	9	9	Bournemouth 5 p.c. ...	15—16	...	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12⅝—13½	...	...
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	11½—11⅝	...	..
50,000	Stk.	June 25	3	3	Do. 3 p.c. Deb. ...	60—63*	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	80—83*	−1	...
357,900	,,	Mar. 19	7½	7½	Brighton & Hove 6 p.c. Con.	112—117	...	...
371,880	,,	,,	6⅜	6⅜	Do. 5 p.c. Con.	105—108	+1	106½—107½
1,287,500	,,	Feb. 19	5	5	Bristol 5 p.c. max.	95½—96½[a]	+½	...
120,420	,,	June 25	4	4	Do. 1st 4 p.c. Deb. ...	77—79*	−1	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	77—79*	−1	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	98—99[a]*	−½	...
855,000	,,	Apl. 9	7	8	British Ord.	110—115	...	113½
100,000	,,	June 25	7	7	Do. 7 p.c. Pref.	110—115*	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	74—77*	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	92—97*	...	...
160,000	,,	June 25	5	5	Cambridge 5 p.c. Deb. ...	95—98*	...	...
100,000	10	May 21	6	8	Cape Town, Ltd.	9—10	...	9½
100,000	10	May 7	4½	4½	Do. 4½ p.c. Pref. ...	6½—7½	...	6⅝
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb. ...	72—77*	...	...
626,860	,,	Feb. 19	6	6	Cardiff Con. Ord.	97—100	+1	99
237,860	,,	June 25	7½	7½	Do. 7½ p.c. Red. Deb. ...	97—100*	...	...
157,150	,,	Feb. 19	5	6⅛	Chester 5 p.c. Ord.	85—90[b]	...	..
98,936	1	May 7	†2/-	†2/-	Colombo, Ltd. Ord.... ...	28/—33/-	...	...
24,500	1	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	17/6—19/6	...	...
609,204	1	Apl. 9	1/4⅜	15/27[d]	Colonial Gas Assn. Ltd. Ord.	16/—18/-	...	17/6—18/-
296,053	1	,,	1/7½	17/67[d]	Do. 8 p.c. Pref.	17/6—19/6	...	...
2,073,280	Stk.	Feb. 19	6	6	Commercial Ord.	94—97	...	*95½
475,000	,,	June 11	3	3	Do. 3 p.c. Deb. ...	58—61	+2	56⅜—59
787,560	,,	Feb. 19	7	7	Croydon sliding scale ...	108—111	...	110⅜
453,100	,,	,,	5	5	Do. max. div.	82—85	...	...
542,270	,,	Mar. 5	7	10	Derby Con.	122—125*	+2	...
55,000	,,	June 25	4	4	Do. Deb.	65—70*	...	...
209,000	,,	Mar. 5	5	5	East Hull Ord. 5 p.c. ...	72—75	...	...
1,002,180	,,	Mar. 19	†4	†6½	European, Ltd.	85—95	...	85—86½
18,953,033	,,	Feb. 19	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	19/—20/-[f]	+-/3	19/1½—19/9
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. ...	64—67	...	66⅛—67
4,294,691	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	79—82	+1	80⅜—81⅜
5,694,095	,,	June 11	3	3	Do. 3 p.c. Con. Deb. ...	63—66	+2	63½—64½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	99—102*	...	100—101
2,500,000	,,	,,	—	—	Do. 4½ p.c. Red. Deb. ...	96—99	+1	96¼—99
161,480	,,	Mar. 5	10	10	Harrogate Cons. 10 p.c. max.	158—163	...	...
82,500	,,	Mar. 19	7	7	Hastings & St. L. 5 p.c. Conv.	98—103	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	82—85	...	...
70,000	10	Oct. 9	½	10	Hongkong & China, Ltd. ...	13—14	...	...
213,200	Stk.	Mar. 5	6	6	Hornsey Con. 3½ p.c. ...	91—94	...	...
2,800,000	,,	May 21	15	25	Imperial Continental Cap.	325—345	+10	327—341
223,130	,,	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	78—83	...	...
235,242	,,	Mar. 5	8½	8½	Lea Bridge 5 p.c. Ord. ...	127—130	...	...
2,145,907	,,	Feb. 19	6	6	Liverpool 5 p.c. Ord. ...	99⅜—100½[b]	−¼	...
600,000	,,	Mar. 19	7	7	Do. 7 p.c. Red. Pref.	98¾—100½[b]	...	...
165,736	,,	Feb. 19	9	9	Maidstone 5 p.c. Cap. ...	128—133	...	...
63,480	,,	June 25	3	3	Do. 3 p.c. Deb. ...	55—58*	+1	56½—57½
75,000	5	June 11	†10	†10	Malta & Mediterranean ... Metropolitan (of Melbourne)	6—6⅛	+¼	6¼—6⅜
392,000	—	Apl. 2	5½	5½	5½ p.c. Red. Deb.	86—89	...	...
675,000	Stk.	May 21	†6	†6	Montevideo, Ltd.	90—100	...	...
2,061,315	,,	Mar. 5	5	5½	Newcastle & Gateshead Con.	15/9—16/6[d/f]	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	75—77[d]	...	...
691,705	,,	Jan. 8	3½	3½	Do. 3½ p.c. Deb. ...	68½—69½[d]	−1	...
277,385	,,	May 7	5	5	Do. 5 p.c. Red. Deb.	98—100[d]	...	...
199,940	,,	Mar. 5	7½	7½	North Middlesex 6 p.c. Con.	115—120	...	...
396,160	,,	Feb. 5	5	5	Northampton 5 p.c. max. ...	74—79	...	...
300,000	,,	Apl. 23	9	7	Oriental, Ltd.	98—103	−2	100—100½
60,000	5	13 May, '15	—	—	Ottoman	0—½	...	...
205,162	Stk.	June 25	8	8	Plym'th & Stonehouse 5 p.c.	110—115*	...	...
424,416	,,	Feb. 19	8	8	Portsm'th Con. Stk. 4 p.c. Std.	122—127	...	127
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	78—81	...	...
686,312	,,	Jan. 22	4	4	Primitiva 4 p.c. Rd. Db. 1911	85—88	...	...
389,813	,,	June 25	4	4	Do. 4 p.c. Cons. Deb.	84—87*	−1	...
150,000	10	Apl. 9	6	6	San Paulo 6 p.c. Pref. ...	8—8½	...	...
1,736,968	Stk.	Mar. 19	6½	6½	Sheffield Cons.	105—107[e]	...	...
95,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	79—81[e]	...	...
90,000	10	June 11	†5	†5	South African	3½—5½*	...	...
6,709,895	Stk.	Feb. 5	5	7½	South Met. Ord.	103½—105½	+1	102⅝—104⅝
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	113—116	...	114⅛—115⅝
1,895,445	,,	Jan. 8	3	3	Do. 3 p.c. Deb. ...	63—66	+2	63—63½
734,000	,,	Mar. 5	6⅛	6⅛	Do. 6⅛ p.c. Red. Db.	98—100	...	...
1,000,000	,,	Jan. 22	—	4	Do. 5 p.c. Red. Deb.	101—104	...	103
91,500	,,	Mar. 5	8½	8½	South Shields Con.	114—116[d]	...	...
1,543,795	,,	Feb. 19	6⅝	6⅝	South Suburban Ord. 5 p.c.	103—106	+1	102½—105½
668,837	,,	June 25	5	5	Do. 5 p.c. Deb.	100—103*	−1	102—102½
647,740	,,	Feb. 19	5	5	Southampt'n Ord. 5 p.c. max.	77—80	..	...
121,275	,,	June 25	4	4	Do. 4 p.c. Deb.	75—78*	...	...
179,014	,,	Mar. 5	8	8	Sutton Ord.	120—130	...	...
94,500	,,	June 25	5	5	Do. 5 p.c. Deb.	96—99*	...	...
250,000	,,	Mar. 5	7	7	Swansea 7 p.c. Red. Pref. ...	96—99	...	...
200,000	,,	June 25	6½	6½	Do. 6½ p.c. Red. Deb.	99—102*	−1	...
1,076,490	,,	Mar. 5	6⅝	6⅝	Tottenham District Ord. ...	103—107	+1	104—105
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	101—104	...	...
199,005	,,	June 11	4	4	Do. 4 p.c. Deb. ...	78—81	+3	79⅜—79⅞
85,701	,,	Mar. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	74—79	...	75
310,694	,,	Mar.	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	102—107	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	88—93	...	...
1,322,220	,,	Mar. 5	7	7	Wandsworth, Wimbledon, and Epsom Cons. ...	113—116	...	115—116
426,000	,,	,,	5,	5	Do. 5 p.c. Pref.	97—100	...	99½—100
1,013,464	,,	June 25	5	5	Do. 5 p.c. Deb.	100—103*	...	103

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. = 10 p.ct. p.a. less tax and less tax on interim dividend.

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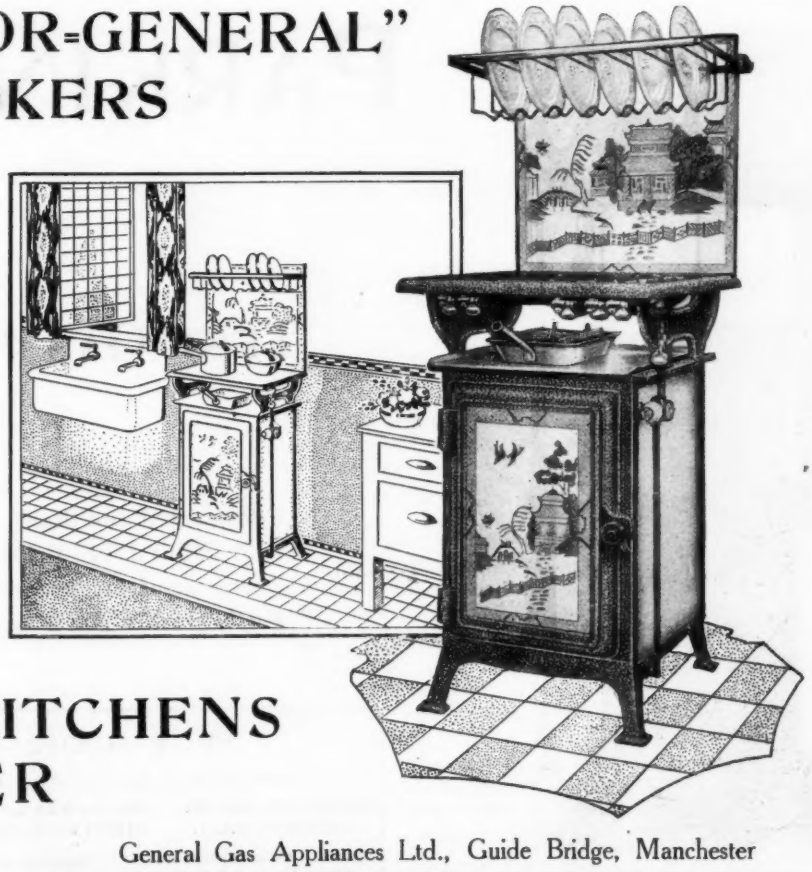

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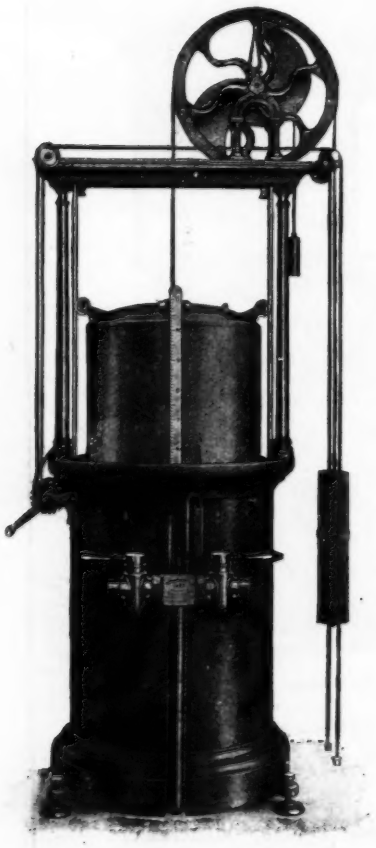

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